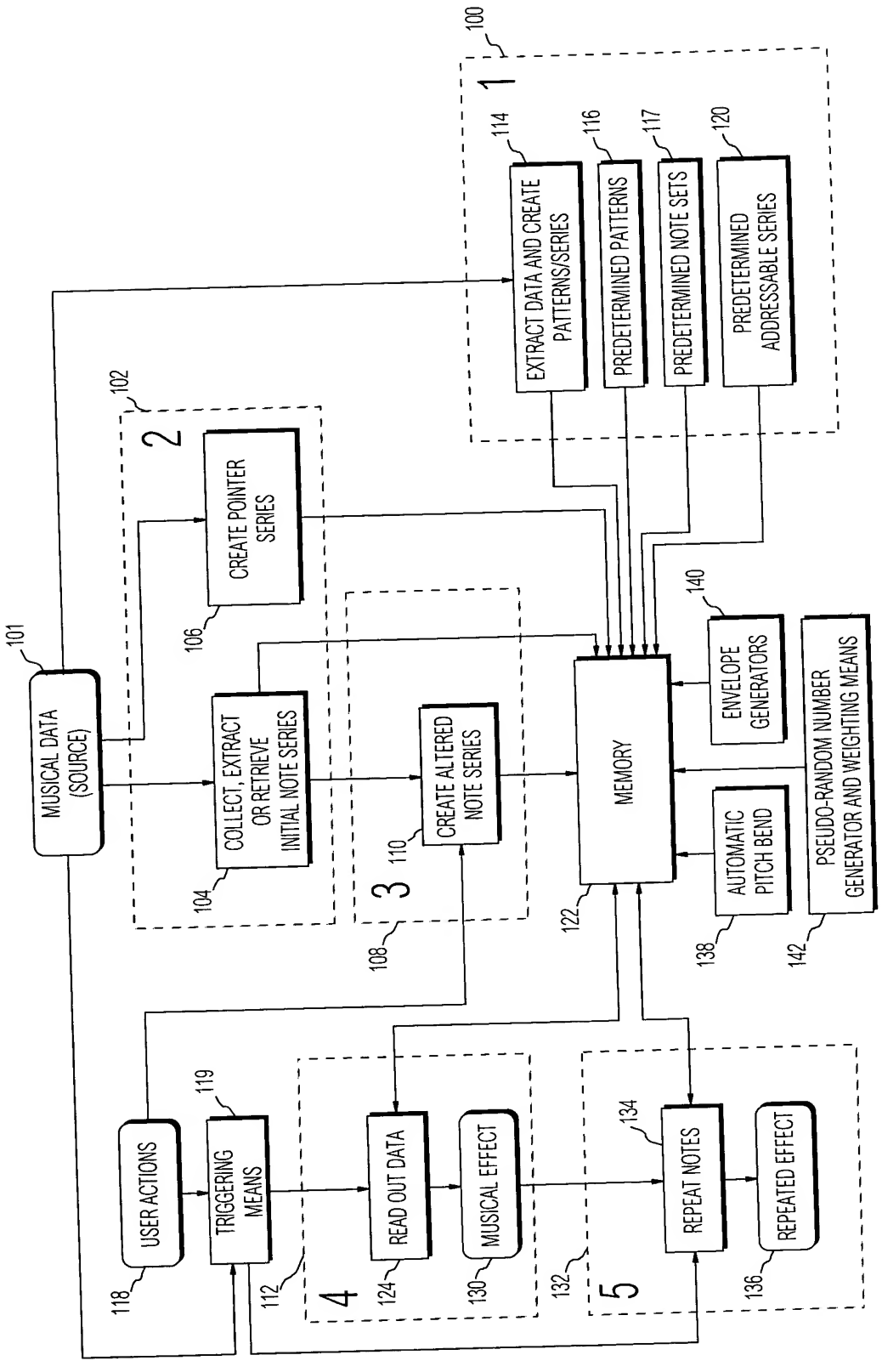

100
1
EXTRACT DATA AND CREATE PATTERNS/SERIES
114
PREDETERMINED PATTERNS
116
PREDETERMINED NOTE SETS
117
PREDETERMINED ADDRESSABLE SERIES
120
102
2
CREATE POINTER SERIES
106
101
MUSICAL DATA (SOURCE)
COLLECT, EXTRACT OR RETRIEVE INITIAL NOTE SERIES
104
3
110
CREATE ALTERED NOTE SERIES
108
MEMORY
122
140
ENVELOPE GENERATORS
AUTOMATIC PITCH BEND
138
PSEUDO-RANDOM NUMBER GENERATOR AND WEIGHTING MEANS
142
USER ACTIONS
118
119
TRIGGERING MEANS
112
4
READ OUT DATA
124
MUSICAL EFFECT
130
132
5
134
REPEAT NOTES
REPEATED EFFECT
136

FIG. 1

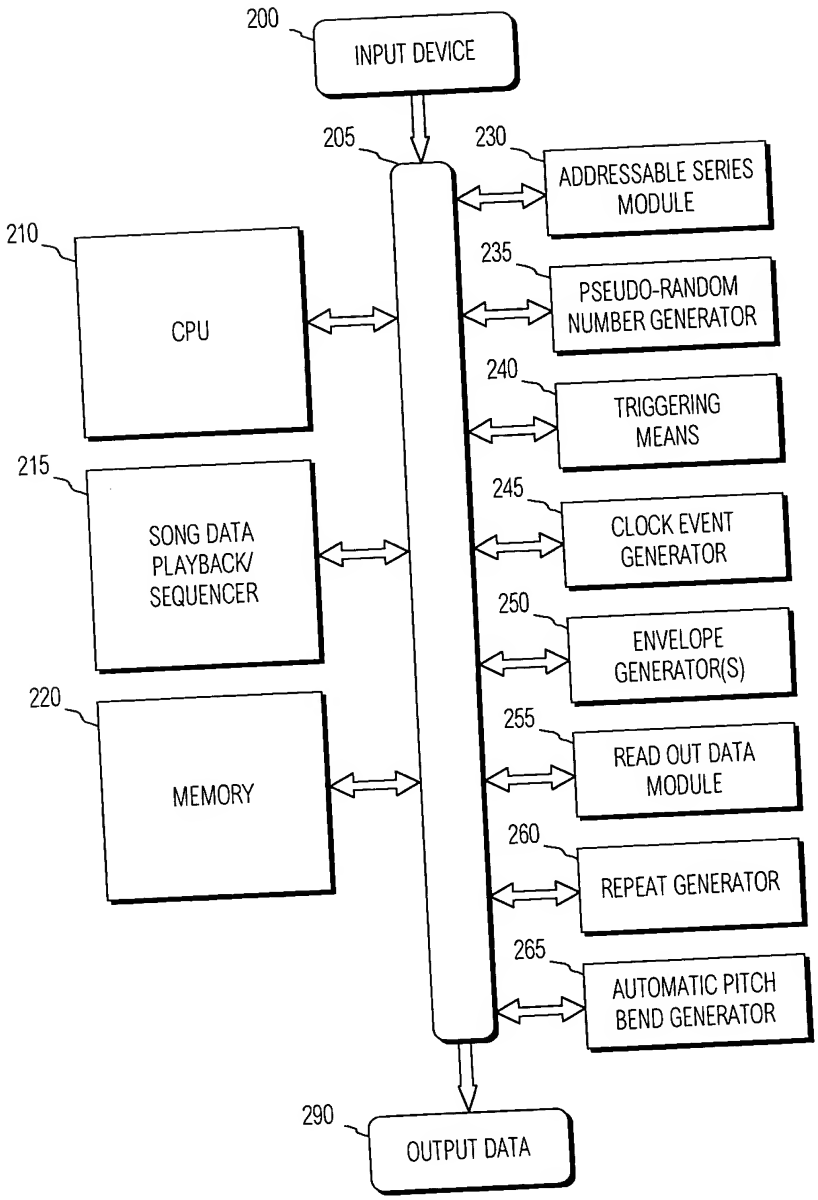

200
INPUT DEVICE
205
230
ADDRESSABLE SERIES MODULE
210
CPU
235
PSEUDO-RANDOM NUMBER GENERATOR
240
TRIGGERING MEANS
215
SONG DATA PLAYBACK/ SEQUENCER
245
CLOCK EVENT GENERATOR
250
ENVELOPE GENERATOR(S)
220
MEMORY
255
READ OUT DATA MODULE
260
REPEAT GENERATOR
265
AUTOMATIC PITCH BEND GENERATOR
290
OUTPUT DATA

FIG. 2

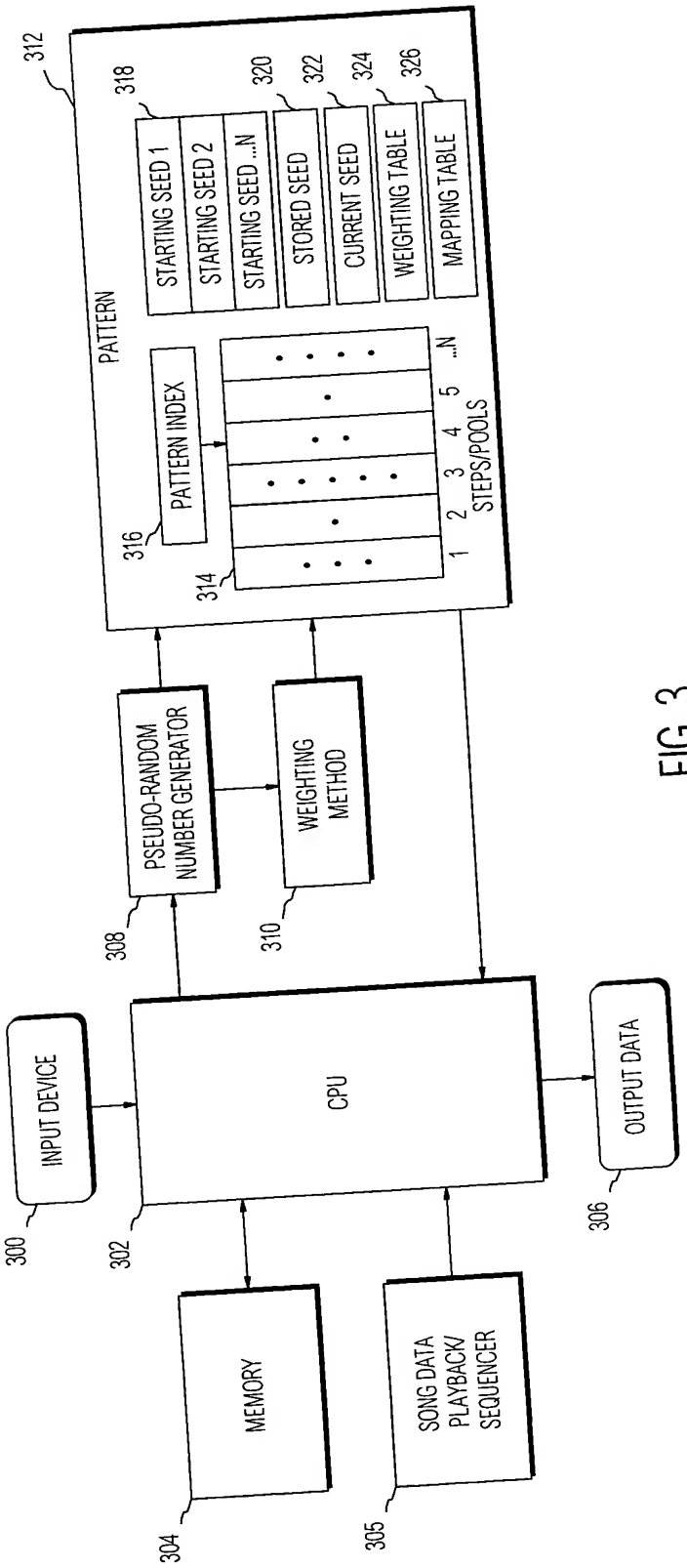

312
PATTERN
318
STARTING SEED 1
STARTING SEED 2
STARTING SEED ...N
320
322
324
326
STORED SEED
CURRENT SEED
WEIGHTING TABLE
MAPPING TABLE
316
PATTERN INDEX
314
1 2 3 4 5 ...N
STEPS/POOLS
PSEUDO-RANDOM NUMBER GENERATOR
308
WEIGHTING METHOD
310
INPUT DEVICE
300
CPU
302
OUTPUT DATA
306
MEMORY
304
SONG DATA PLAYBACK/ SEQUENCER
305

FIG. 3

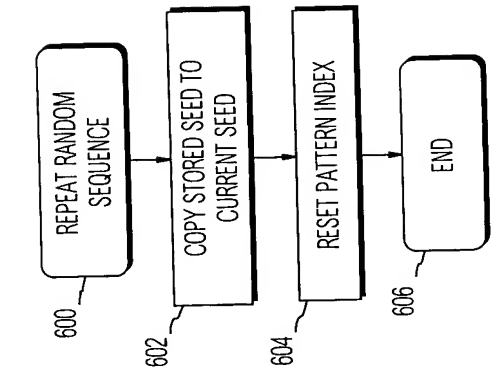


FIG. 6

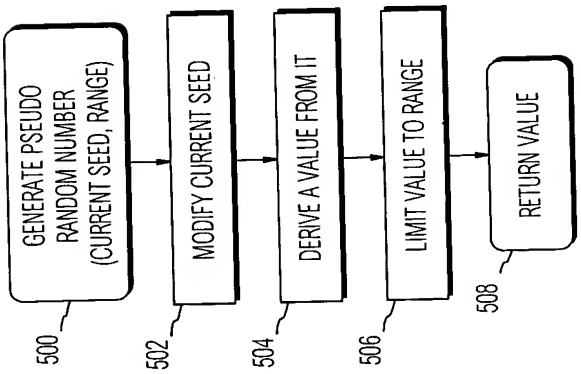


FIG. 5

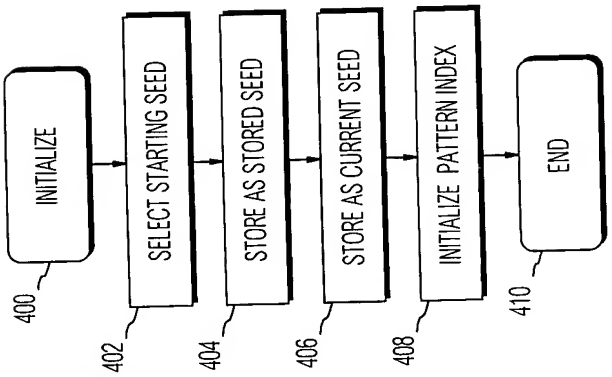


FIG. 4

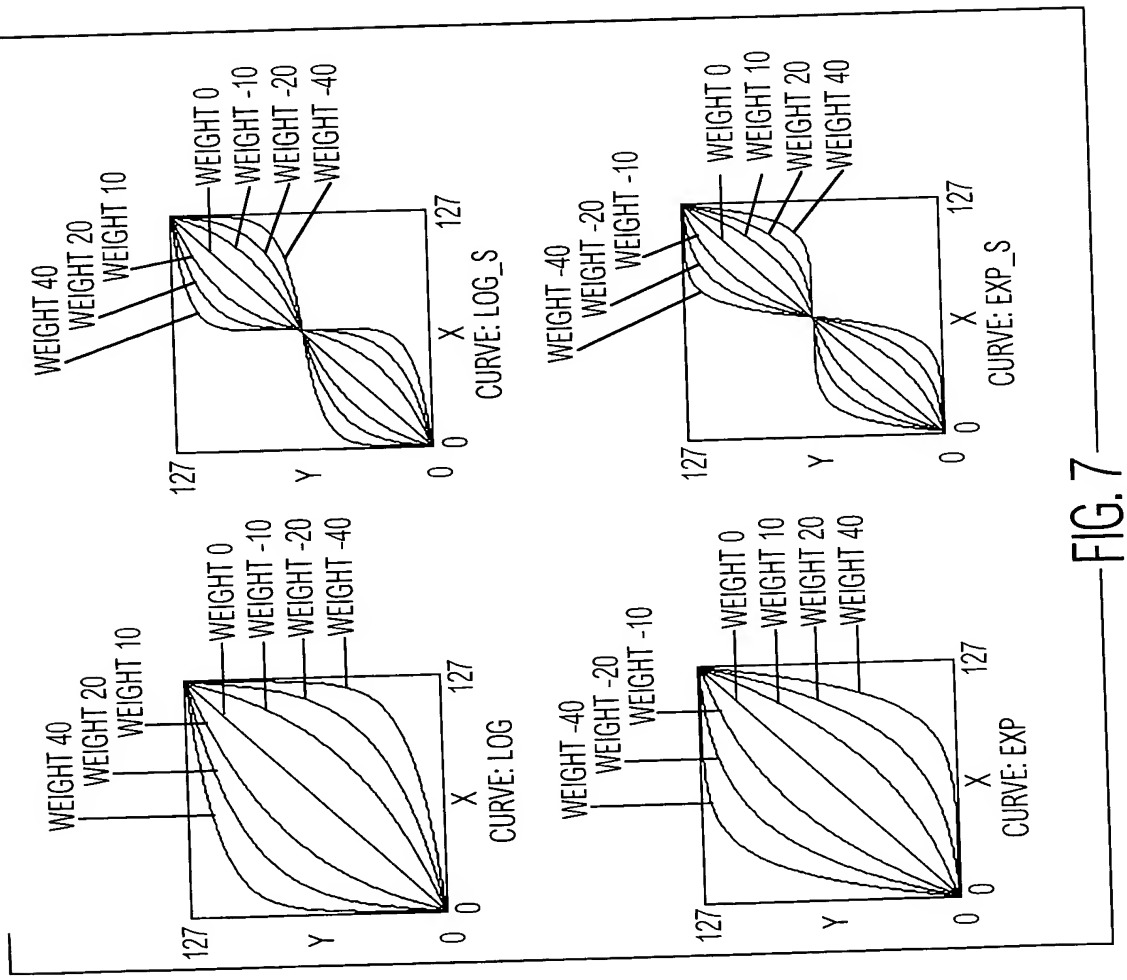

WEIGHT 40
WEIGHT 20
WEIGHT 10
WEIGHT 0
WEIGHT -10
WEIGHT -20
WEIGHT -40
127
Y
0
0
X
127
CURVE: LOG
CURVE: LOG_S
CURVE: EXP
CURVE: EXP_S

FIG. 7

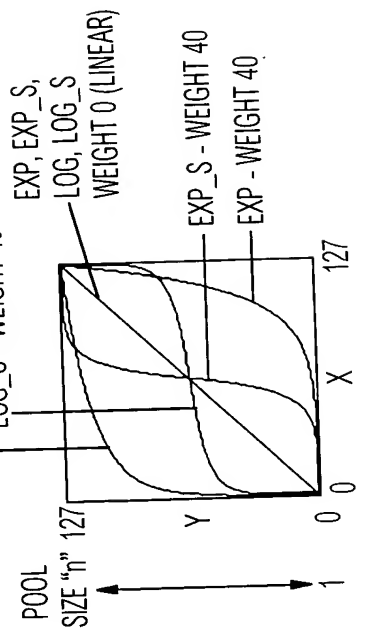

LOG - WEIGHT 40
LOG_S - WEIGHT 40
EXP, EXP_S,
LOG, LOG_S
WEIGHT 0 (LINEAR)
EXP_S - WEIGHT 40
EXP - WEIGHT 40
POOL
SIZE "n"
1
127
Y
0
0
X
127

FIG. 8

x	y
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	0
23	0
24	0
25	0
26	0
27	0
28	0
29	0
30	0
31	1

x	y
32	1
33	1
34	1
35	1
36	1
37	1
38	1
39	1
40	1
41	1
42	1
43	2
44	2
45	2
46	2
47	2
48	2
49	2
50	3
51	3
52	3
53	3
54	3
55	3
56	4
57	4
58	4
59	4
60	5
61	5
62	5
63	5

x	y
64	6
65	6
66	6
67	7
68	7
69	7
70	8
71	8
72	9
73	9
74	10
75	10
76	11
77	11
78	12
79	12
80	13
81	14
82	14
83	15
84	16
85	17
86	17
87	18
88	19
89	20
90	21
91	22
92	23
93	25
94	26
95	27

x	y
96	29
97	30
98	31
99	33
100	35
101	36
102	38
103	40
104	42
105	44
106	46
107	49
108	51
109	53
110	56
111	59
112	62
113	65
114	68
115	71
116	75
117	78
118	82
119	86
120	91
121	95
122	100
123	105
124	110
125	115
126	121
127	127

EXPONENTIAL EQUATION - WEIGHT 30

FIG. 9

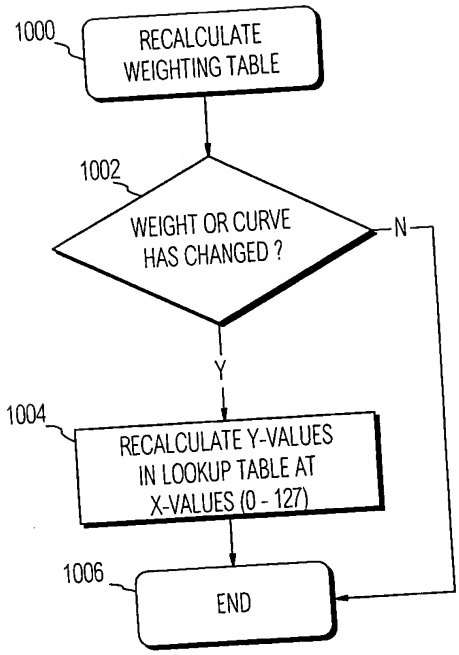

1000
RECALCULATE WEIGHTING TABLE
1002
WEIGHT OR CURVE HAS CHANGED ?
N
Y
1004
RECALCULATE Y-VALUES IN LOOKUP TABLE AT X-VALUES (0 - 127)
1006
END

FIG. 10

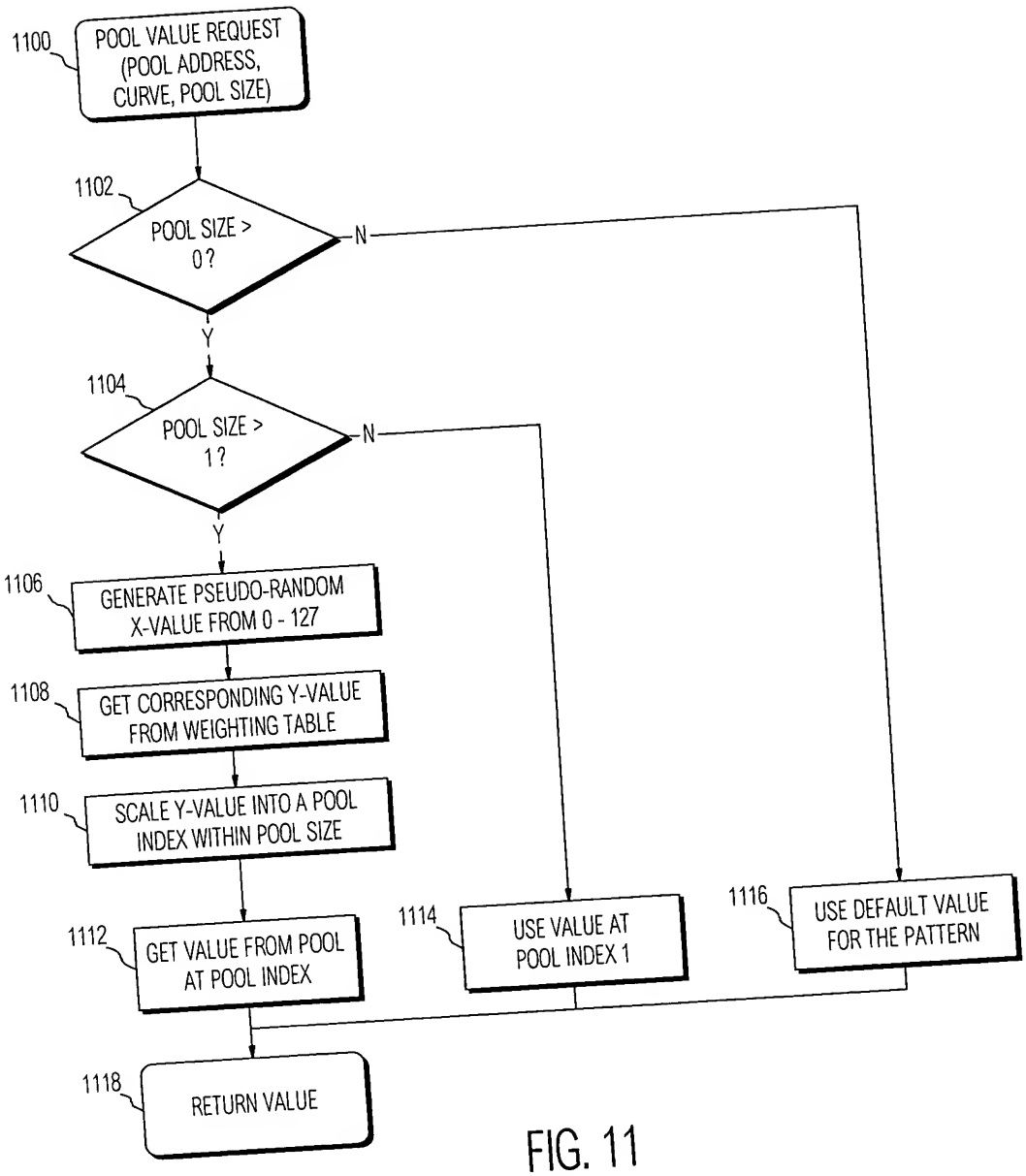

1100
POOL VALUE REQUEST (POOL ADDRESS, CURVE, POOL SIZE)
1102
POOL SIZE > 0?
N
Y
1104
POOL SIZE > 1?
N
Y
1106
GENERATE PSEUDO-RANDOM X-VALUE FROM 0 - 127
1108
GET CORRESPONDING Y-VALUE FROM WEIGHTING TABLE
1110
SCALE Y-VALUE INTO A POOL INDEX WITHIN POOL SIZE
1112
GET VALUE FROM POOL AT POOL INDEX
1114
USE VALUE AT POOL INDEX 1
1116
USE DEFAULT VALUE FOR THE PATTERN
1118
RETURN VALUE

FIG. 11

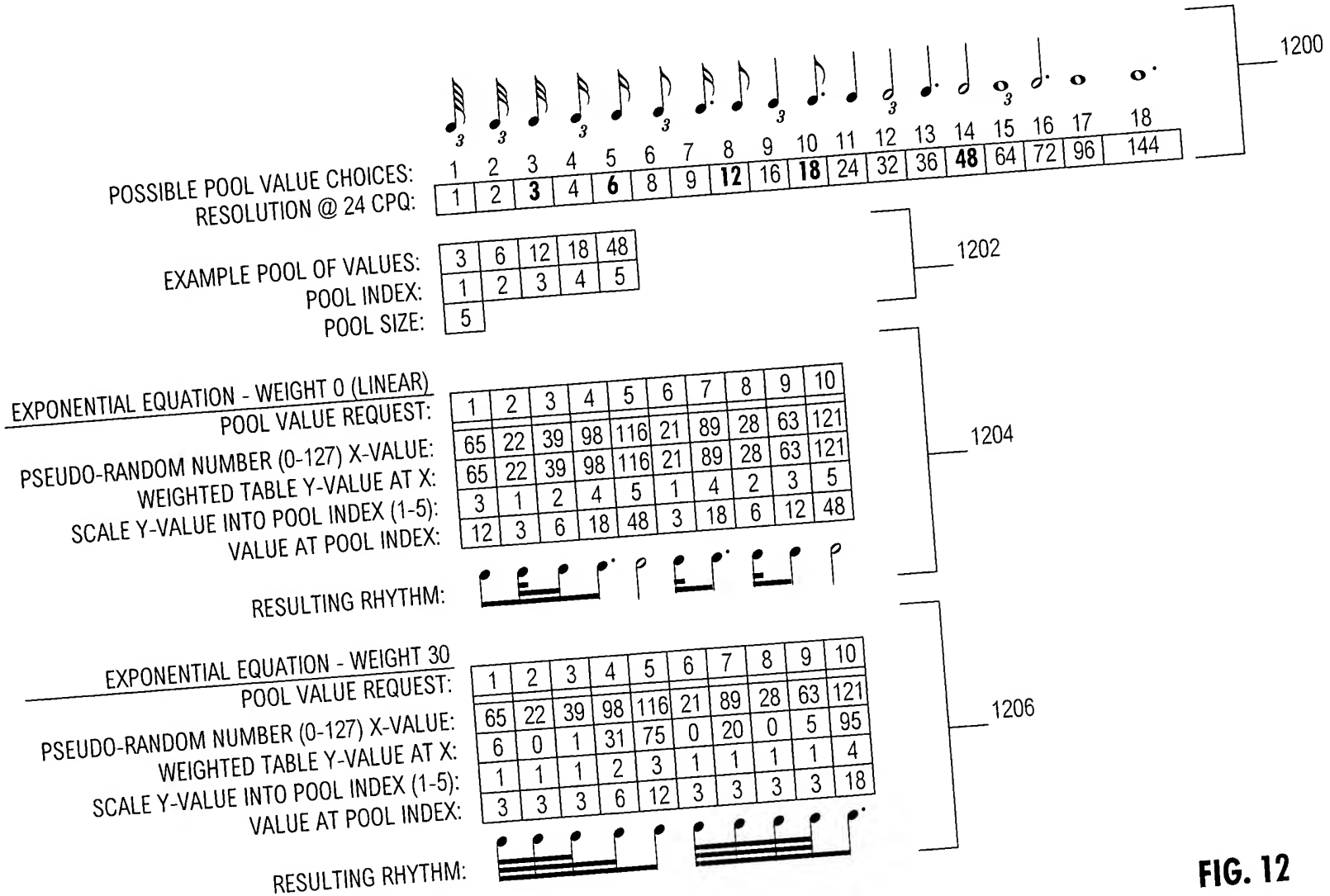

1200
POSSIBLE POOL VALUE CHOICES:
RESOLUTION @ 24 CPQ:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1 2 3 4 6 8 9 12 16 18 24 32 36 48 64 72 96 144
1202
EXAMPLE POOL OF VALUES:
POOL INDEX:
POOL SIZE:
3 6 12 18 48
1 2 3 4 5
5
1204
EXPONENTIAL EQUATION - WEIGHT 0 (LINEAR)
POOL VALUE REQUEST:
PSEUDO-RANDOM NUMBER (0-127) X-VALUE:
WEIGHTED TABLE Y-VALUE AT X:
SCALE Y-VALUE INTO POOL INDEX (1-5):
VALUE AT POOL INDEX:
1 2 3 4 5 6 7 8 9 10
65 22 39 98 116 21 89 28 63 121
65 22 39 98 116 21 89 28 63 121
3 1 2 4 5 1 4 2 3 5
12 3 6 18 48 3 18 6 12 48
RESULTING RHYTHM:
1206
EXPONENTIAL EQUATION - WEIGHT 30
POOL VALUE REQUEST:
PSEUDO-RANDOM NUMBER (0-127) X-VALUE:
WEIGHTED TABLE Y-VALUE AT X:
SCALE Y-VALUE INTO POOL INDEX (1-5):
VALUE AT POOL INDEX:
1 2 3 4 5 6 7 8 9 10
65 22 39 98 116 21 89 28 63 121
6 0 1 31 75 0 20 0 5 95
1 1 1 2 3 1 1 1 1 4
3 3 3 6 12 3 3 3 3 18
RESULTING RHYTHM:

FIG. 12

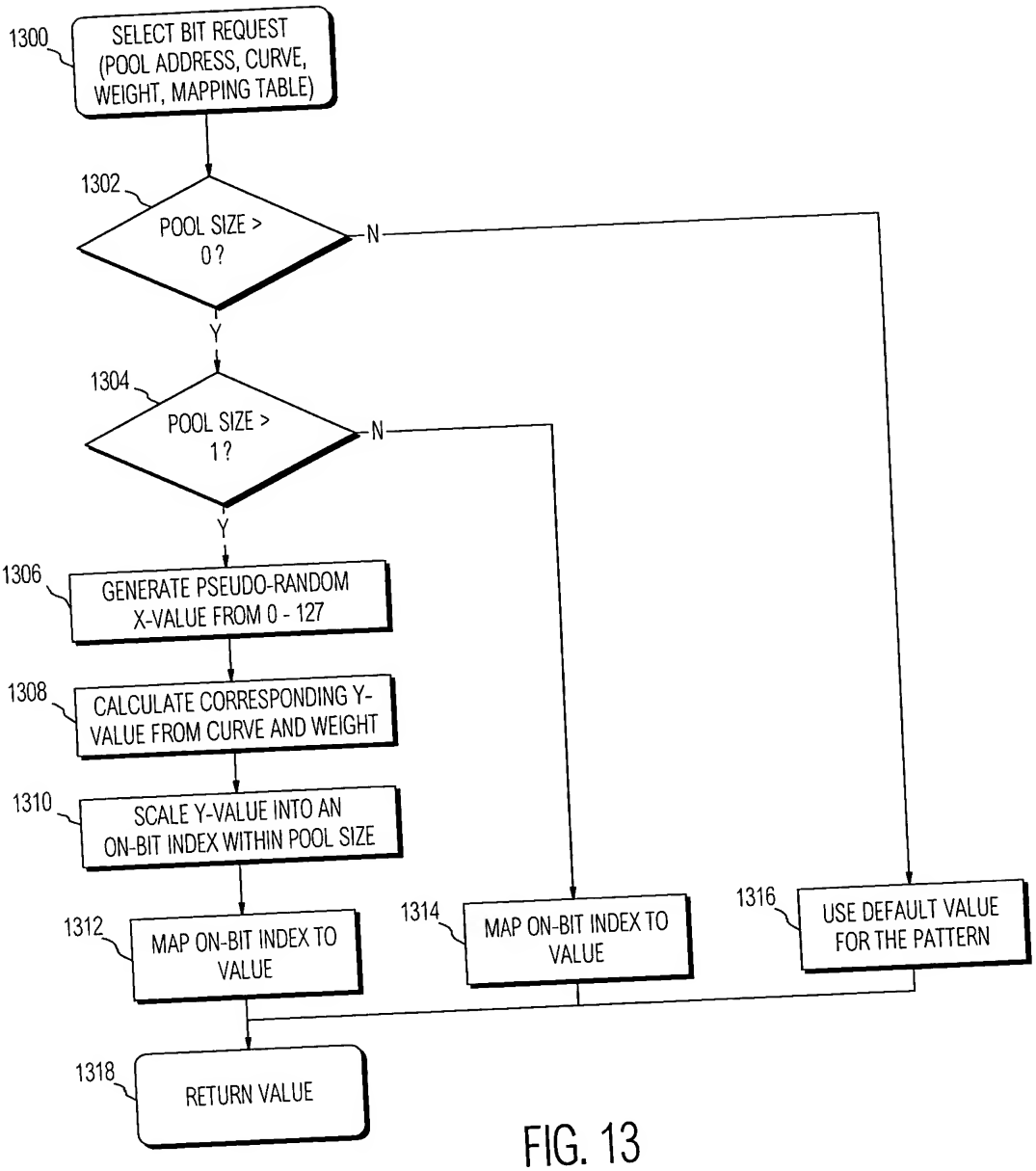
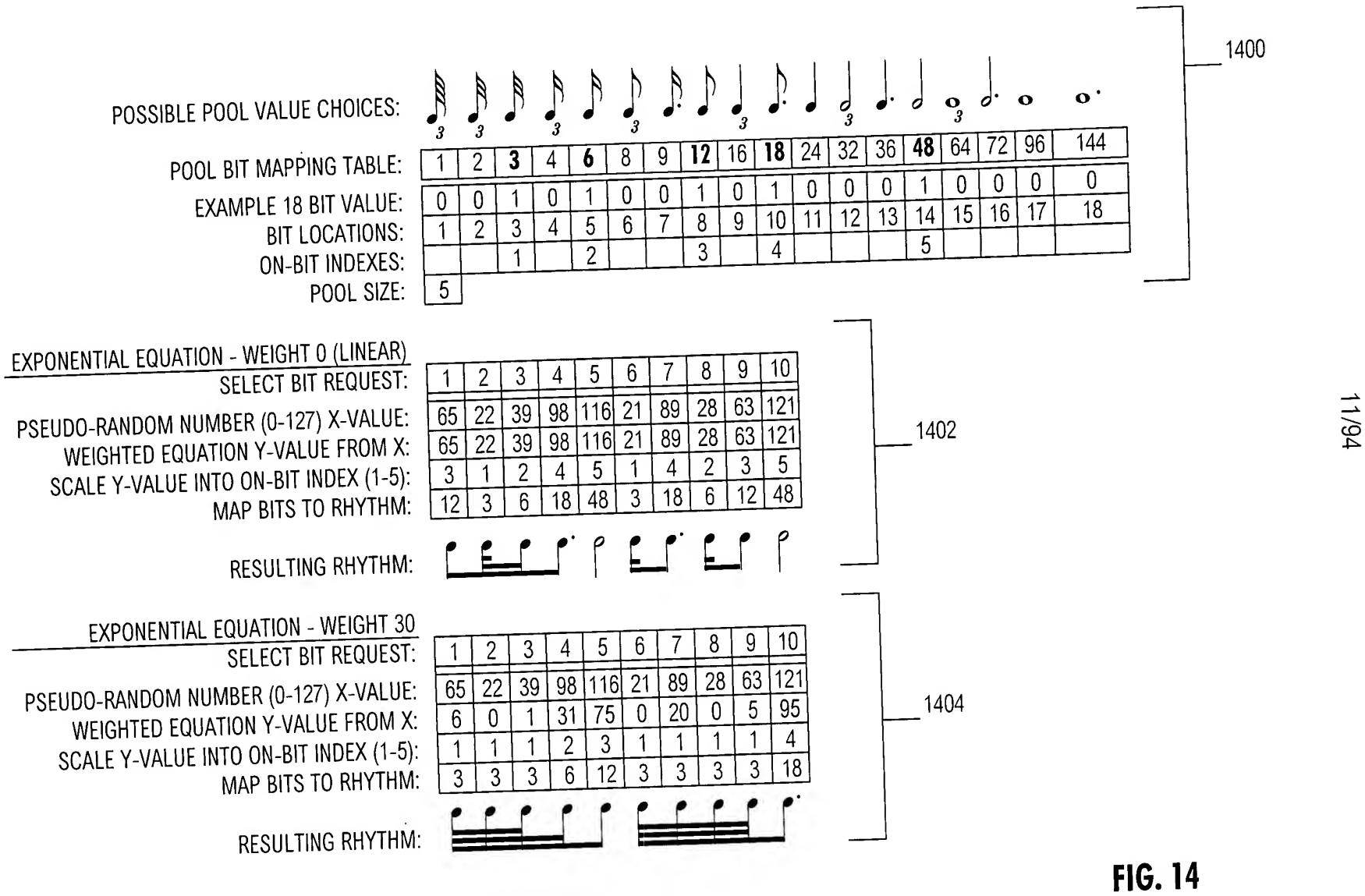

1300
SELECT BIT REQUEST (POOL ADDRESS, CURVE, WEIGHT, MAPPING TABLE)
1302
POOL SIZE > 0?
N
Y
1304
POOL SIZE > 1?
N
Y
1306
GENERATE PSEUDO-RANDOM X-VALUE FROM 0 - 127
1308
CALCULATE CORRESPONDING Y-VALUE FROM CURVE AND WEIGHT
1310
SCALE Y-VALUE INTO AN ON-BIT INDEX WITHIN POOL SIZE
1312
MAP ON-BIT INDEX TO VALUE
1314
MAP ON-BIT INDEX TO VALUE
1316
USE DEFAULT VALUE FOR THE PATTERN
1318
RETURN VALUE

FIG. 13



POOL BIT MAPPING TABLE:	1	2	**3**	4	**6**	8	9	**12**	16	**18**	24	32	36	**48**	64	72	96	144
EXAMPLE 18 BIT VALUE:	0	0	1	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0
BIT LOCATIONS:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
ON-BIT INDEXES:			1		2			3		4				5				
POOL SIZE:	5																	

SELECT BIT REQUEST:	1	2	3	4	5	6	7	8	9	10
PSEUDO-RANDOM NUMBER (0-127) X-VALUE:	65	22	39	98	116	21	89	28	63	121
WEIGHTED EQUATION Y-VALUE FROM X:	65	22	39	98	116	21	89	28	63	121
SCALE Y-VALUE INTO ON-BIT INDEX (1-5):	3	1	2	4	5	1	4	2	3	5
MAP BITS TO RHYTHM:	12	3	6	18	48	3	18	6	12	48

SELECT BIT REQUEST:	1	2	3	4	5	6	7	8	9	10
PSEUDO-RANDOM NUMBER (0-127) X-VALUE:	65	22	39	98	116	21	89	28	63	121
WEIGHTED EQUATION Y-VALUE FROM X:	6	0	1	31	75	0	20	0	5	95
SCALE Y-VALUE INTO ON-BIT INDEX (1-5):	1	1	1	2	3	1	1	1	1	4
MAP BITS TO RHYTHM:	3	3	3	6	12	3	3	3	3	18

FIG. 14

STEP	RHYTHM VALUE	TIE FLAG
1	RHYTHM VALUE	TIE FLAG
2	RHYTHM VALUE	TIE FLAG
3	RHYTHM VALUE	TIE FLAG
4	RHYTHM VALUE	TIE FLAG
...N	RHYTHM VALUE	TIE FLAG

FIG. 15

STEP	RHYTHM VALUE	TIE FLAG
1	16TH	
2	16TH	X
3	16TH	X
4	16TH	X
5	16TH	
6	16TH	X
7	16TH	X
8	16TH	X
9	16TH	
10	16TH	X
11	16TH	X
12	16TH	X
13	32ND	
14	32ND	X
15	32ND	X
16	32ND	X
17	32ND	X
18	32ND	X
19	32ND	X
20	32ND	X

FIG. 17

FIG. 16

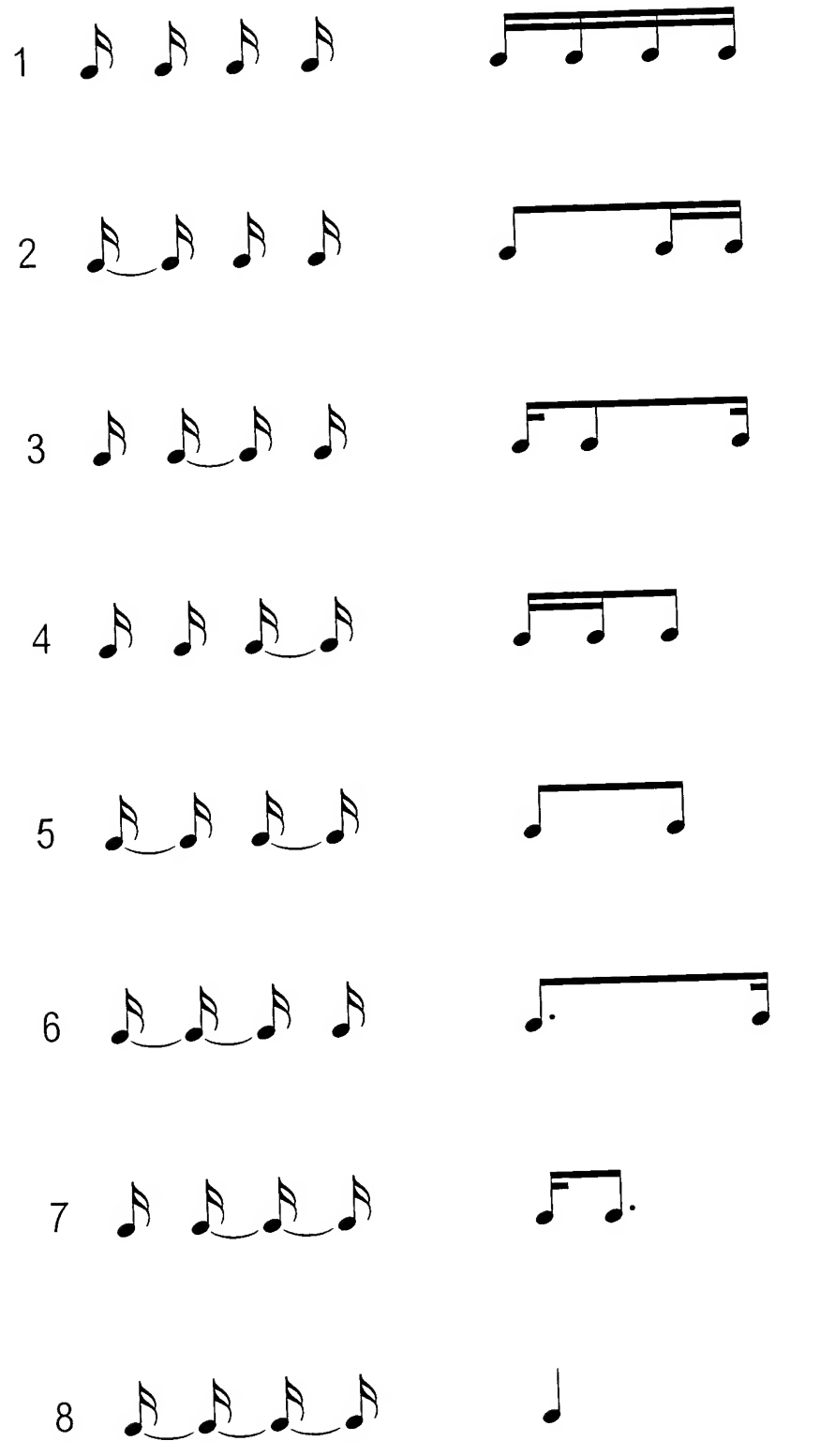


FIG. 17

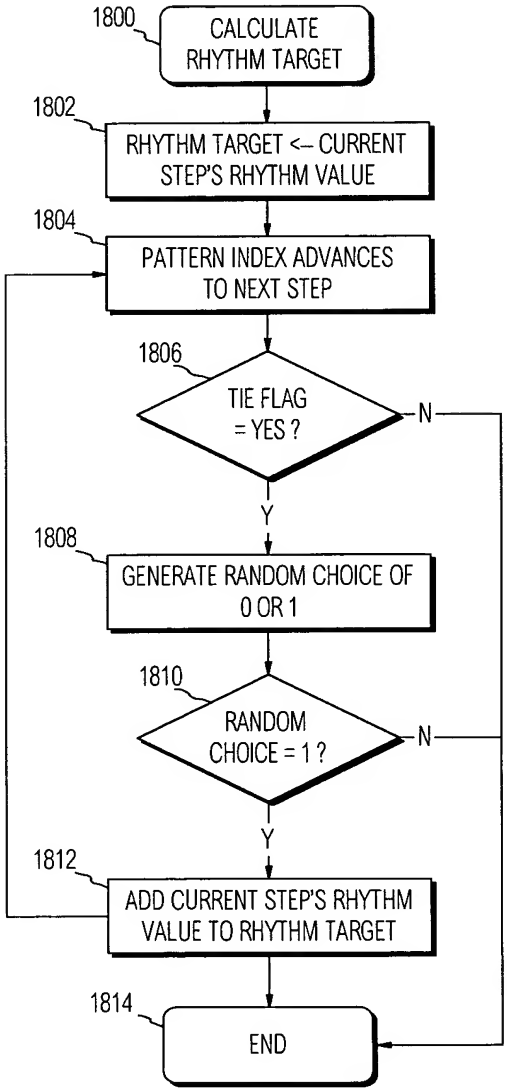

1800
CALCULATE RHYTHM TARGET
1802
RHYTHM TARGET <-- CURRENT STEP'S RHYTHM VALUE
1804
PATTERN INDEX ADVANCES TO NEXT STEP
1806
TIE FLAG = YES ?
N
Y
1808
GENERATE RANDOM CHOICE OF 0 OR 1
1810
RANDOM CHOICE = 1 ?
N
Y
1812
ADD CURRENT STEP'S RHYTHM VALUE TO RHYTHM TARGET
1814
END

FIG. 18

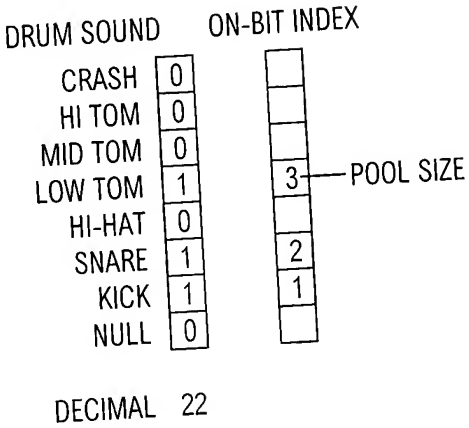

DRUM SOUND
ON-BIT INDEX
CRASH 0
HI TOM 0
MID TOM 0
LOW TOM 1
HI-HAT 0
SNARE 1
KICK 1
NULL 0
3
POOL SIZE
2
1
DECIMAL 22

FIG. 19

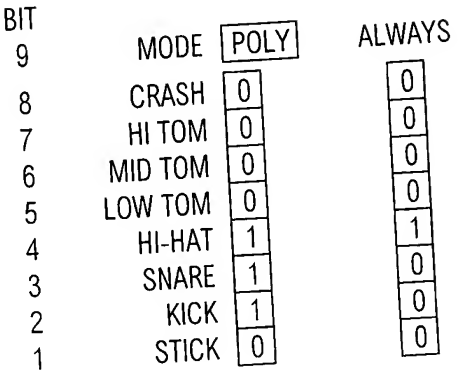
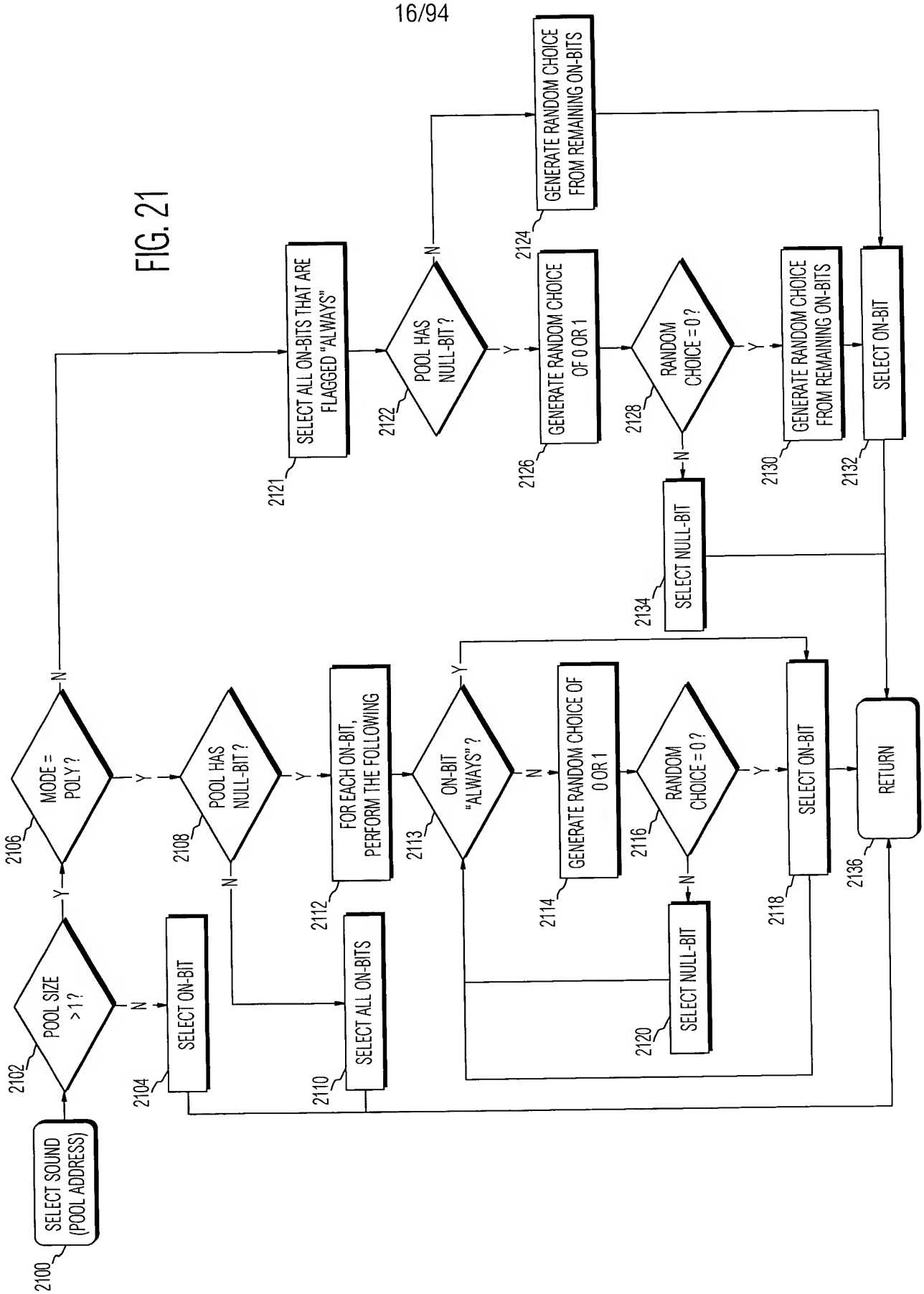
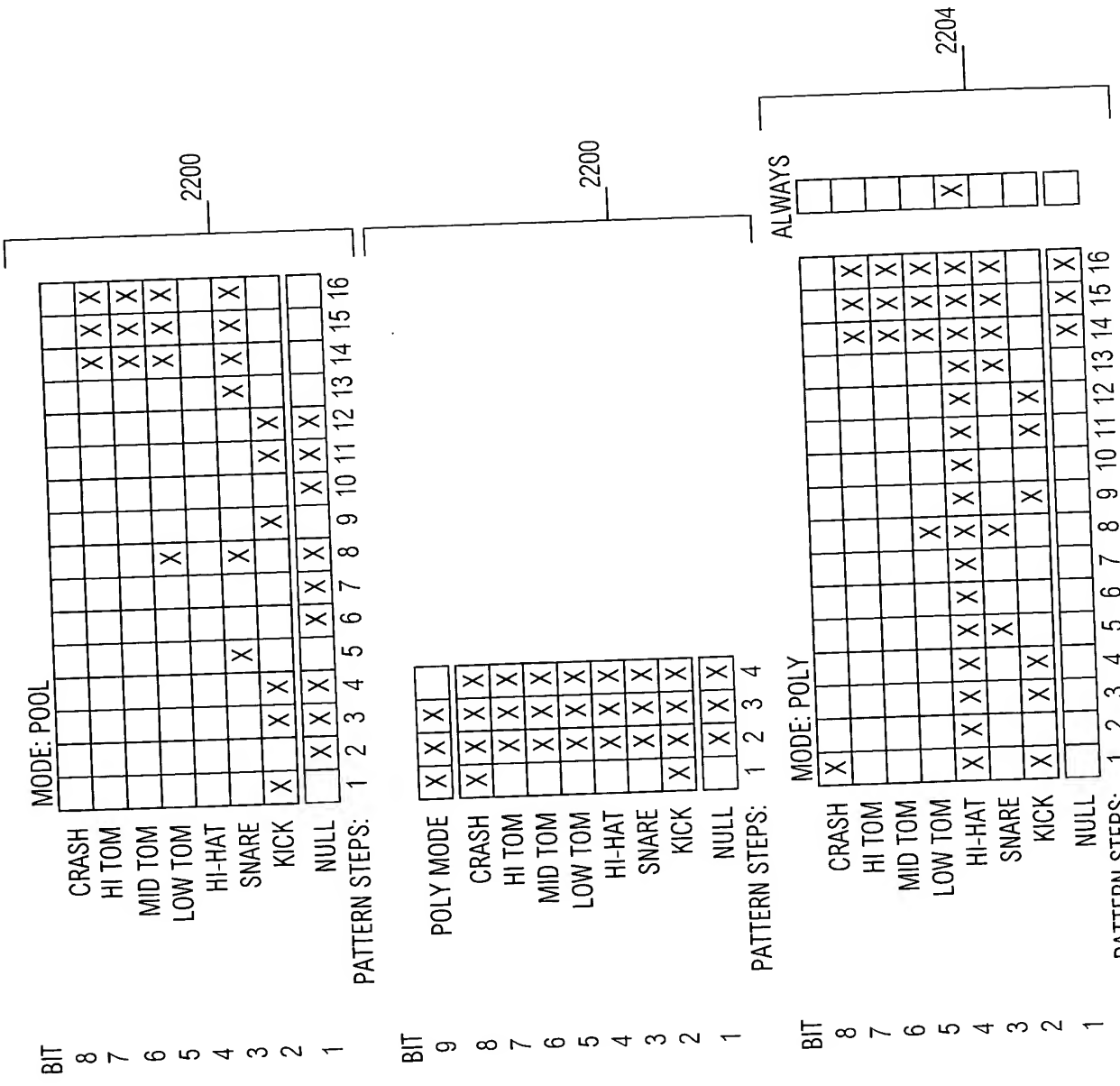

BIT
9
8
7
6
5
4
3
2
1
MODE
POLY
ALWAYS
CRASH 0
HI TOM 0
MID TOM 0
LOW TOM 0
HI-HAT 1
SNARE 1
KICK 1
STICK 0
0
0
0
0
1
0
0
0

FIG. 20

FIG. 21


2100
SELECT SOUND (POOL ADDRESS)
2102
POOL SIZE >1?
N
2104
SELECT ON-BIT
Y
2106
MODE = POLY?
N
2108
POOL HAS NULL-BIT?
N
2110
SELECT ALL ON-BITS
Y
2112
FOR EACH ON-BIT, PERFORM THE FOLLOWING
2113
ON-BIT "ALWAYS"?
N
2114
GENERATE RANDOM CHOICE OF 0 OR 1
2116
RANDOM CHOICE = 0?
N
2120
SELECT NULL-BIT
Y
2118
SELECT ON-BIT
Y
2121
SELECT ALL ON-BITS THAT ARE FLAGGED "ALWAYS"
2122
POOL HAS NULL-BIT?
N
2124
GENERATE RANDOM CHOICE FROM REMAINING ON-BITS
Y
2126
GENERATE RANDOM CHOICE OF 0 OR 1
2128
RANDOM CHOICE = 0?
N
2134
SELECT NULL-BIT
Y
2130
GENERATE RANDOM CHOICE FROM REMAINING ON-BITS
2132
SELECT ON-BIT
2136
RETURN


2200
MODE: POOL
BIT
CRASH
HI TOM
MID TOM
LOW TOM
HI-HAT
SNARE
KICK
NULL
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
2200
POLY MODE
BIT
CRASH
HI TOM
MID TOM
LOW TOM
HI-HAT
SNARE
KICK
NULL
PATTERN STEPS: 1 2 3 4
2204
ALWAYS
MODE: POLY
BIT
CRASH
HI TOM
MID TOM
LOW TOM
HI-HAT
SNARE
KICK
NULL
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

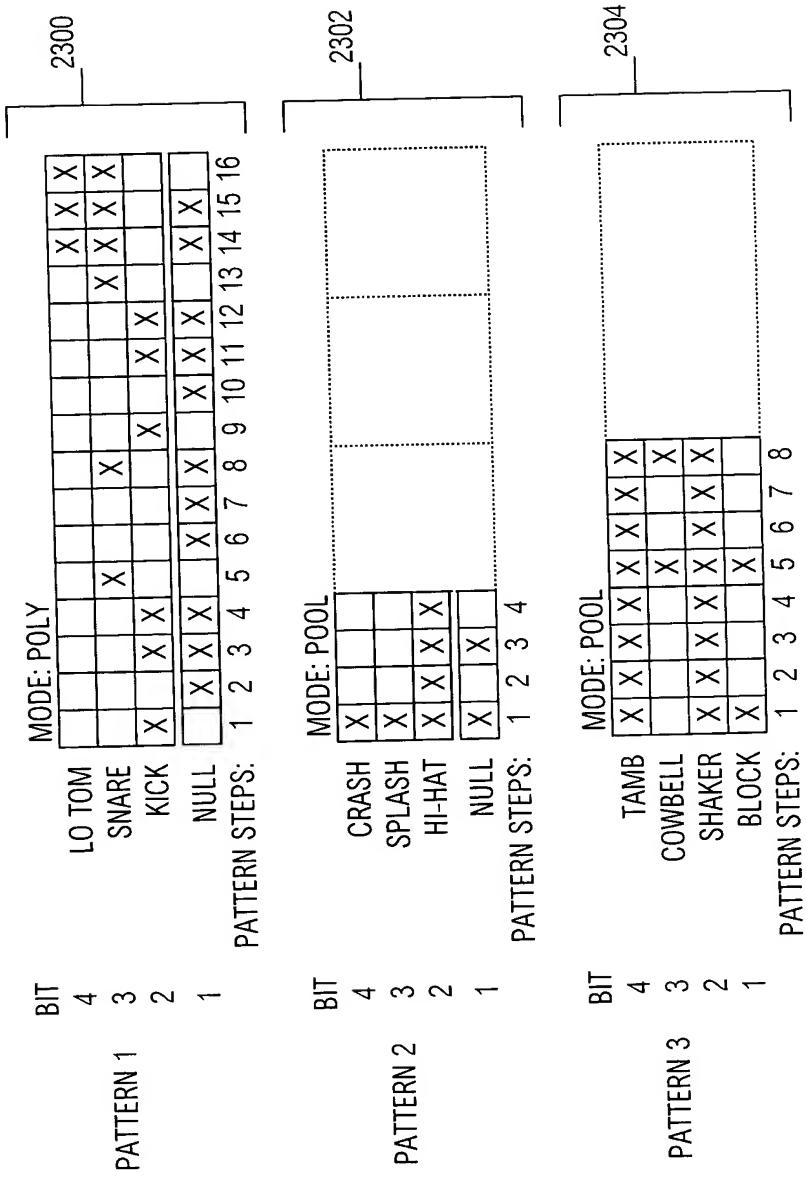

2300
MODE: POLY
BIT
4
3
2
1
LO TOM
SNARE
KICK
NULL
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
PATTERN 1
2302
MODE: POOL
CRASH
SPLASH
HI-HAT
NULL
PATTERN STEPS: 1 2 3 4
PATTERN 2
2304
MODE: POOL
TAMB
COWBELL
SHAKER
BLOCK
PATTERN STEPS: 1 2 3 4 5 6 7 8
PATTERN 3

FIG. 23

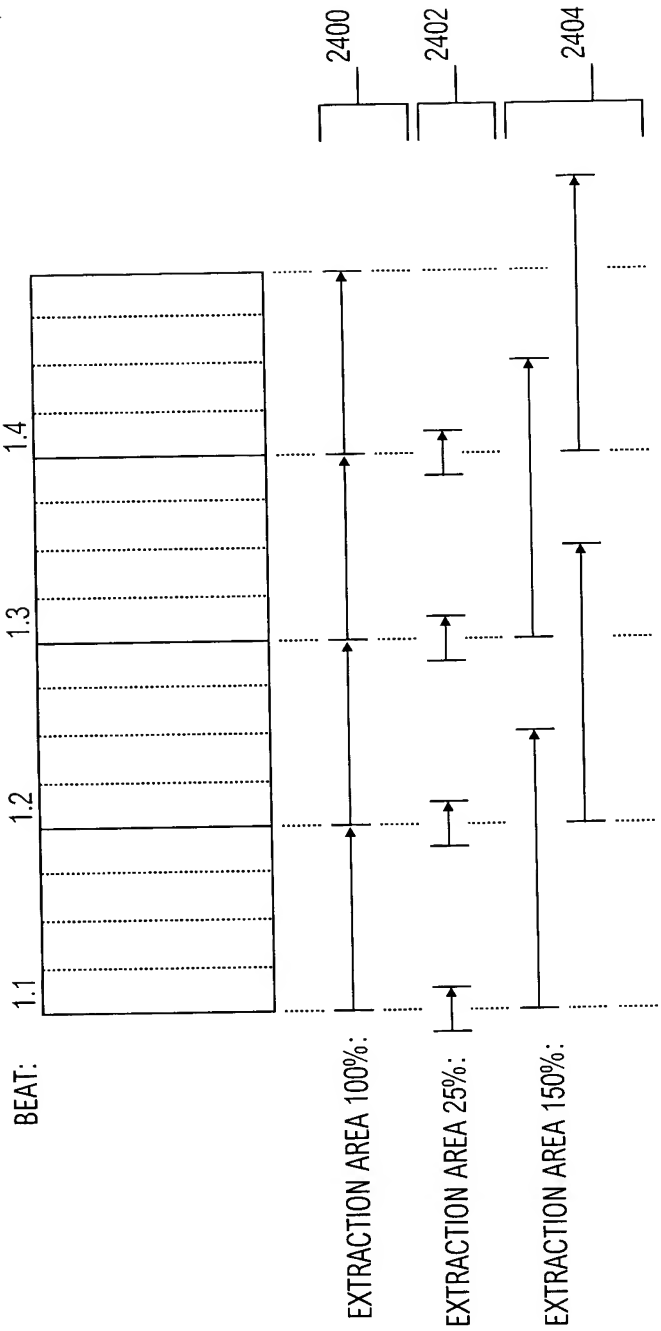

2400
2402
2404
BEAT:
1.1
1.2
1.3
1.4
EXTRACTION AREA 100%:
EXTRACTION AREA 25%:
EXTRACTION AREA 150%:

FIG. 24

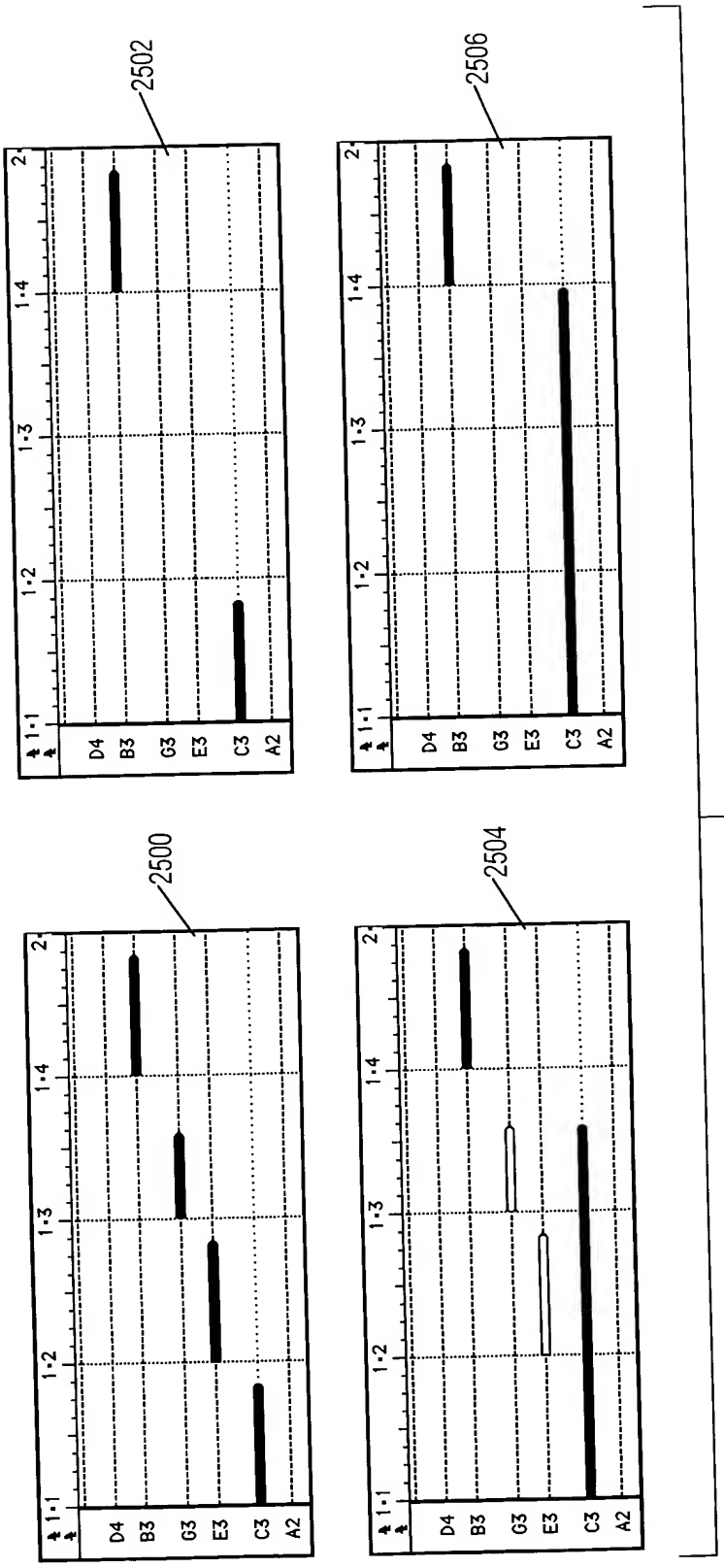


FIG. 25

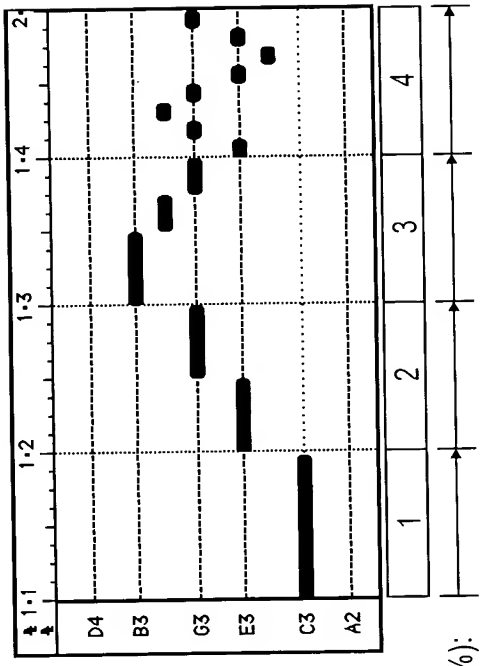

1·1
1·2
1·3
1·4
2·
D4
B3
G3
E3
C3
A2
1
2
3
4
EXTRACTION AREAS (100%):

FIG. 26

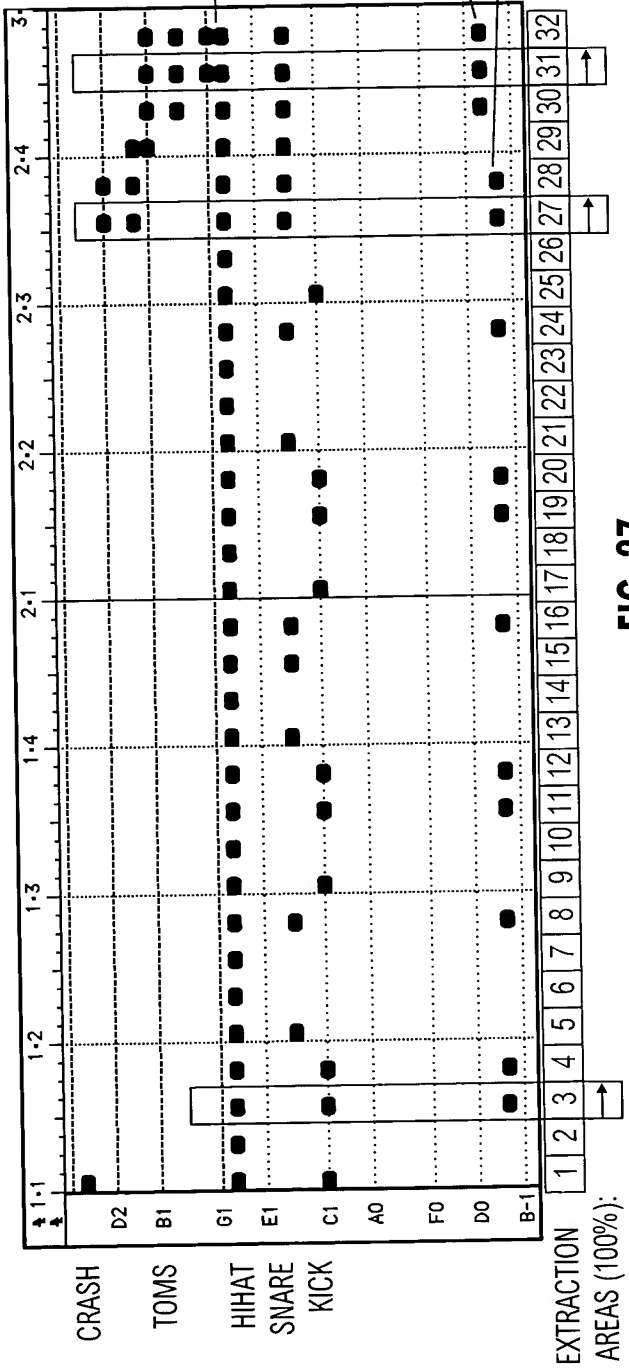

ALWAYS
(25) RANDOM CHOICE IND. 2
(24) RANDOM CHOICE IND. 1
CRASH
TOMS
HIHAT
SNARE
KICK
D2
B1
G1
E1
C1
A0
F0
D0
B-1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
EXTRACTION AREAS (100%):

FIG. 27

DELTA	ACCUM_DELTA	EVENT	PITCH	VELOCITY	CONTROL #	VALUE	EVENT GROUPS
0	0	PRG CHANGE				21	
0	0	NOTE-ON	60	117			
0	0	CONTROLLER			10	0	1
1	1	NOTE-ON	67	127			
3	4	NOTE-ON	64	100			
2	6	NOTE-ON	71	105			
42	48	NOTE-ON	60	0*			
0	48	CONTROLLER			10	32	
1	49	NOTE-ON	67	0*			2
2	51	NOTE-ON	64	0*			
2	53	NOTE-ON	71	0*			
19	72	NOTE-ON	62	113			3
12	84	NOTE-ON	62	0*			4
12	96	PRG CHANGE				33	
0	96	CONTROLLER			10	64	
1	97	NOTE-ON	72	114			5
0	97	NOTE-ON	69	102			
1	98	NOTE-ON	65	117			
22	120	NOTE-ON	72	0*			
2	122	NOTE-ON	69	0*			6
3	125	NOTE-ON	65	0*			
19	144	CONTROLLER			10	96	7
0	144	NOTE-ON	70	115			
12	156	NOTE-ON	70	0*			8
11	167	NOTE-ON	67	117			9
13	180	NOTE-ON	67	0*			10

*NOTE-OFF

FIG. 28

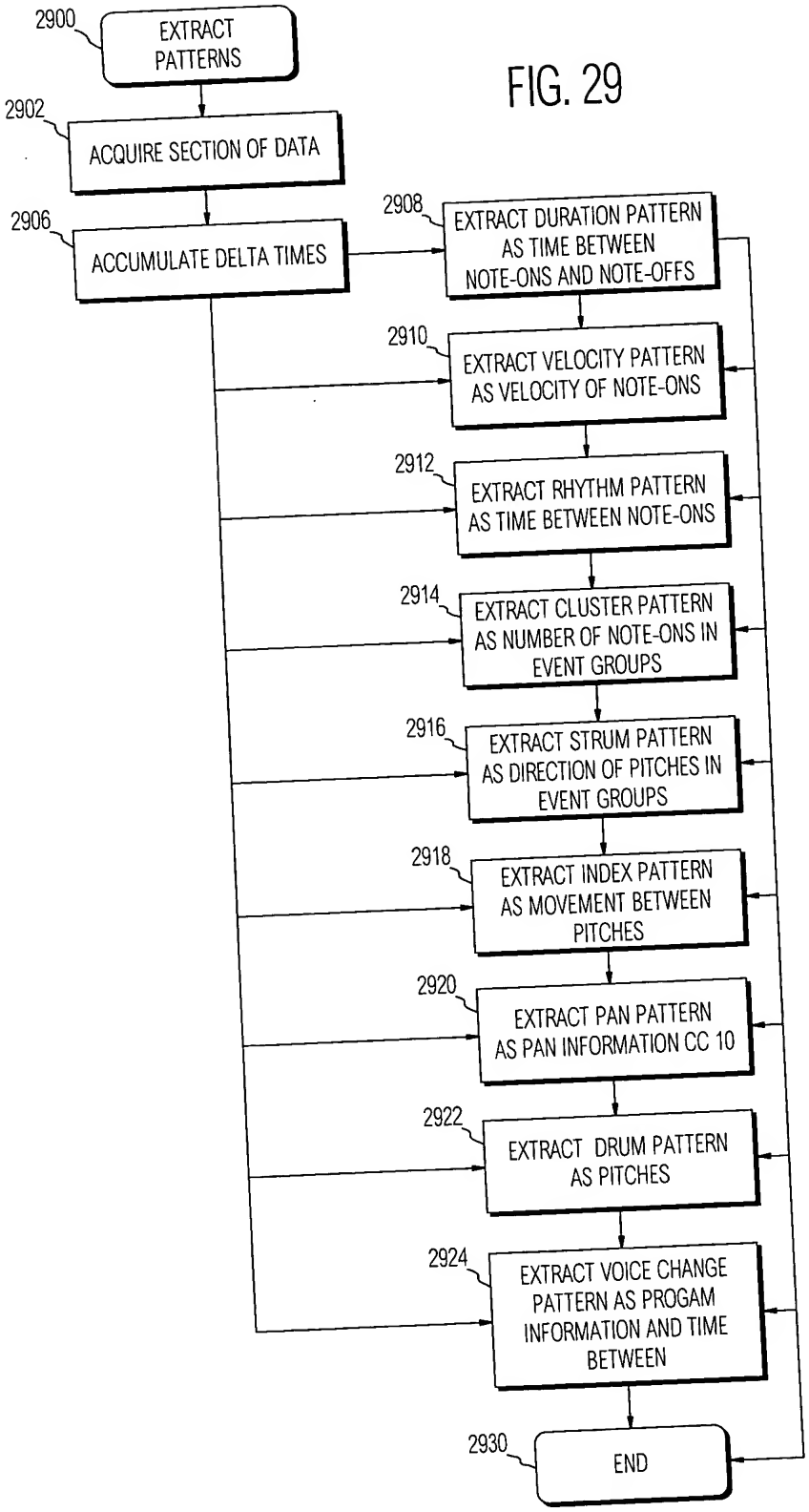

2900
EXTRACT PATTERNS
2902
ACQUIRE SECTION OF DATA
2906
ACCUMULATE DELTA TIMES
2908
EXTRACT DURATION PATTERN AS TIME BETWEEN NOTE-ONS AND NOTE-OFFS
2910
EXTRACT VELOCITY PATTERN AS VELOCITY OF NOTE-ONS
2912
EXTRACT RHYTHM PATTERN AS TIME BETWEEN NOTE-ONS
2914
EXTRACT CLUSTER PATTERN AS NUMBER OF NOTE-ONS IN EVENT GROUPS
2916
EXTRACT STRUM PATTERN AS DIRECTION OF PITCHES IN EVENT GROUPS
2918
EXTRACT INDEX PATTERN AS MOVEMENT BETWEEN PITCHES
2920
EXTRACT PAN PATTERN AS PAN INFORMATION CC 10
2922
EXTRACT DRUM PATTERN AS PITCHES
2924
EXTRACT VOICE CHANGE PATTERN AS PROGAM INFORMATION AND TIME BETWEEN
2930
END

FIG. 29

EVENT GROUPS	PITCH	DELTA_ACCUM NOTE-ON	DELTA_ACCUM NOTE-OFF	DURATION
1,2	60	0	48	**48**
	67	1	49	48
	64	4	51	47
	71	6	53	47
3,4	62	72	84	**12**
5,6	72	97	120	23
	69	97	122	25
	65	98	125	**27**
7,8	70	144	156	**12**
9,10	67	167	180	**13**

DURATION PATTERN

QUANTIZED:	48	12	24	12	12
24 CPQ:	12	3	6	3	3

3000

EVENT GROUPS	PITCH	VELOCITY
1	60	117
	67	**127**
	64	100
	71	105
3	62	**113**
5	72	114
	69	112
	65	**117**
7	70	**115**
9	67	**117**

VELOCITY PATTERN

ABSOLUTE:	127	113	117	115	117
MODIFY:	0	-14	-10	-12	-10

	127				
	117		117		
	100		114		
	105	113	112	115	117
POOL SIZE:	4	1	3	1	1

3002

EVENT GROUPS	PITCH	DELTA_ ACCUM NOTE-ON	DISTANCE FROM 1ST NOTE-ON IN NEXT EVENT GROUP
1	60	0	**72**
	67	1	72
	64	4	71
	71	6	71
3	62	72	**25**
5	72	97	**47**
	69	97	47
	65	98	46
7	70	144	**23**
9	67	167	**25**

RHYTHM PATTERN

QUANTIZED:	72	24	48	24	24
24 CPQ:	18	6	12	6	6

3004

FIG. 30

EVENT GROUPS	NOTE-ONS IN GROUP
1	4
3	1
5	3
7	1
9	1

CLUSTER PATTERN

	4	1	3	1	1

BIT 4	X				
BIT 3	X		X		
BIT 2	X		X		
BIT 1	X	X	X	X	X

3100

EVENT GROUPS	PITCH
1	**60**
	67
	64
	71
5	**72**
	69
	65

STRUM PATTERN

UP	DOWN

3102

EVENT GROUPS	PITCH	DISTANCE TO NEXT FIRST	DISTANCE TO NEXT ALL
1	**60**	2	7
	67		-3
	64		7
	71		-9
3	**62**	10	10
5	**72**	-2	-3
	69		-4
	65		5
7	**70**	-3	-3
9	**67**	-7	-7

INDEX PATTERN

SCALED/LIMITED:

2	10	-2	-3	-7
1	4	-1	-1	-3

POOL SIZE:

7		5		
-3		-3		
-9	10	-4	-3	-7
3	1	3	1	1

3104

FIG. 31

EVENT GROUPS	CONTROLLER	VALUE
1	10	0
2	10	32
5	10	64
7	10	96

PAN PATTERN

0	32	64	96

3200

EVENT GROUPS	PROGRAM CHANGE	NOTE-ONS IN GROUP
1	21	4
3		1
5	33	3
7		1
9		1

VOICE CHANGE PATTERN

21	33
5	5

3202

EVENT GROUPS	PITCH
1	**60**
	67
	64
	71
3	**62**
5	72
	69
	65
7	**70**
9	**67**

DRUM PATTERN

60	62	65	70	67

3204

60				
67		72		
64		69		
71	62	65	70	67
POOL SIZE: 4	1	3	1	1

FIG. 32

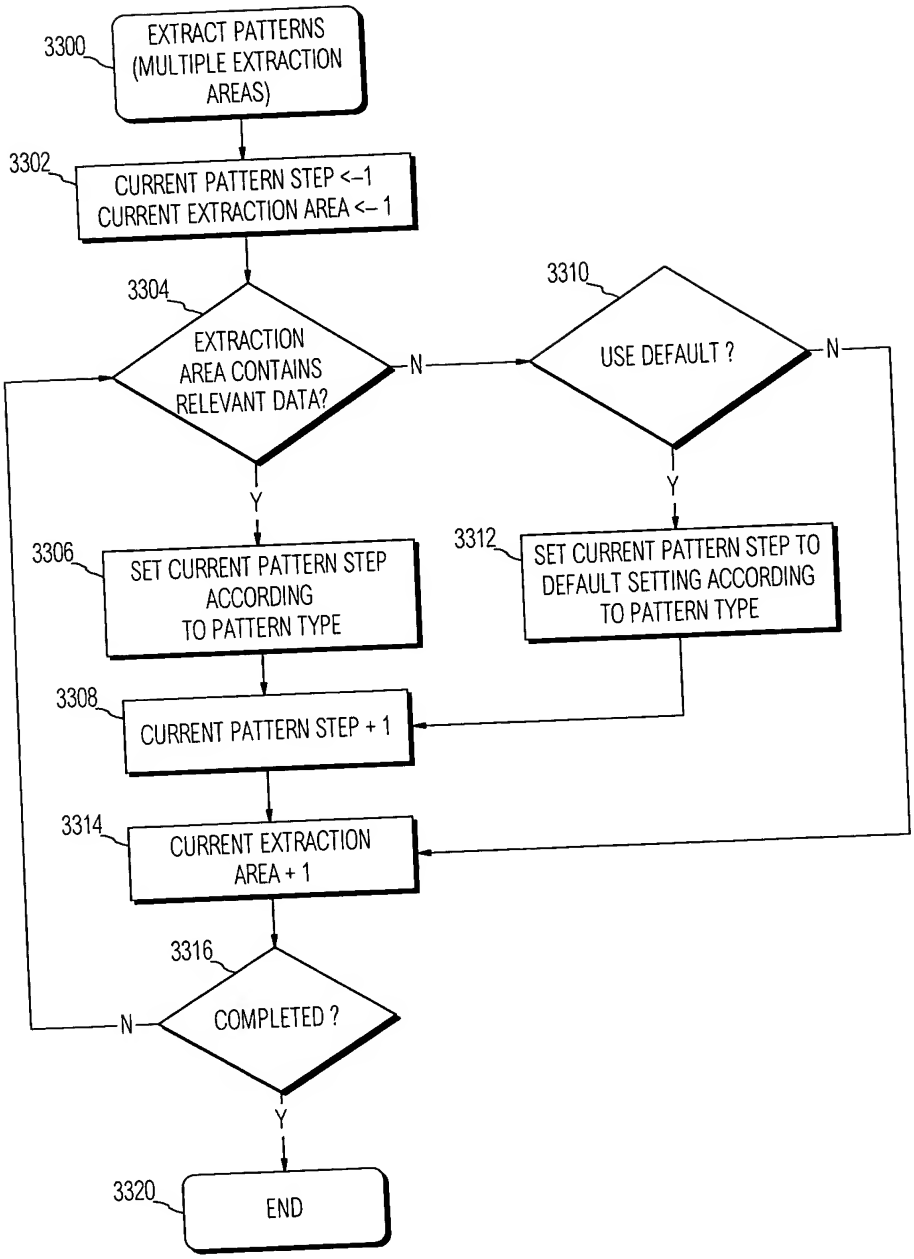

3300
EXTRACT PATTERNS (MULTIPLE EXTRACTION AREAS)
3302
CURRENT PATTERN STEP <–1
CURRENT EXTRACTION AREA <– 1
3304
EXTRACTION AREA CONTAINS RELEVANT DATA?
N
Y
3310
USE DEFAULT ?
N
Y
3306
SET CURRENT PATTERN STEP ACCORDING TO PATTERN TYPE
3312
SET CURRENT PATTERN STEP TO DEFAULT SETTING ACCORDING TO PATTERN TYPE
3308
CURRENT PATTERN STEP + 1
3314
CURRENT EXTRACTION AREA + 1
3316
COMPLETED ?
N
Y
3320
END

FIG. 33

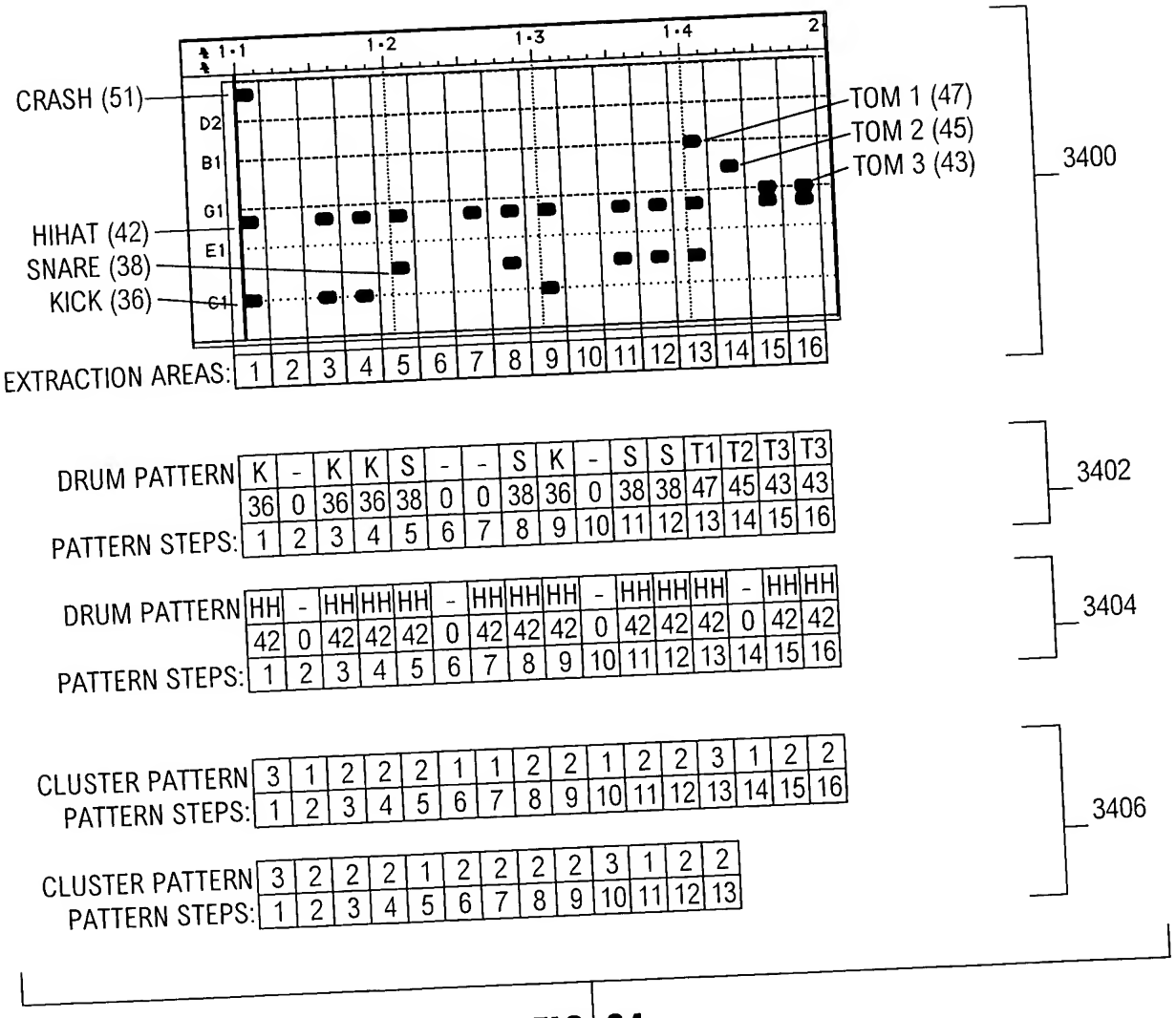

1·1
1·2
1·3
1·4
2
CRASH (51)
HIHAT (42)
SNARE (38)
KICK (36)
D2
B1
G1
E1
C1
TOM 1 (47)
TOM 2 (45)
TOM 3 (43)
3400
EXTRACTION AREAS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
DRUM PATTERN K - K K S - - S K - S S T1 T2 T3 T3
36 0 36 36 38 0 0 38 36 0 38 38 47 45 43 43
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
3402
DRUM PATTERN HH - HH HH HH - HH HH HH - HH HH HH - HH HH
42 0 42 42 42 0 42 42 42 0 42 42 42 0 42 42
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
3404
CLUSTER PATTERN 3 1 2 2 2 1 1 2 2 1 2 2 3 1 2 2
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
CLUSTER PATTERN 3 2 2 2 1 2 2 2 2 3 1 2 2
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13
3406

FIG. 34

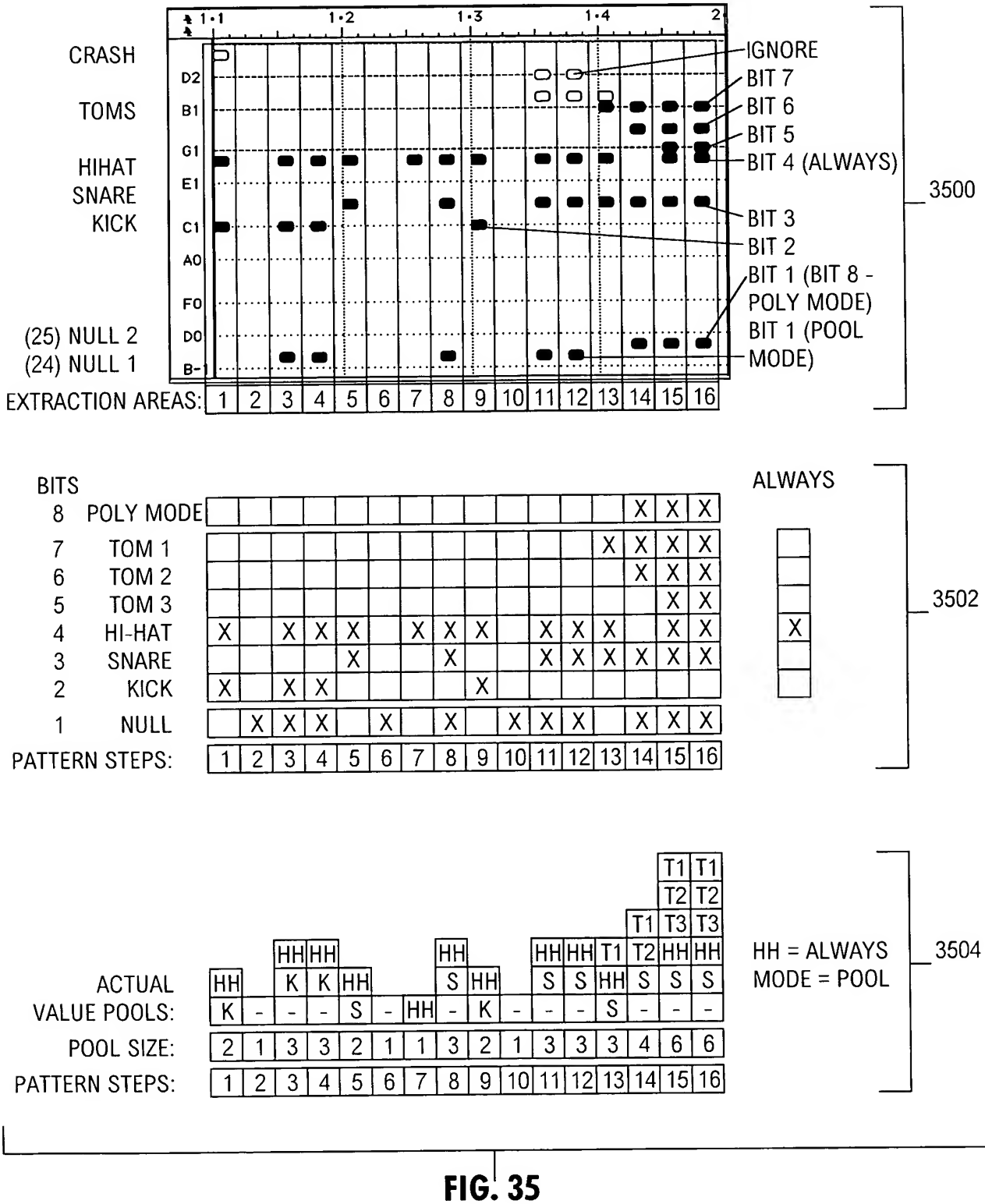

CRASH
TOMS
HIHAT
SNARE
KICK
(25) NULL 2
(24) NULL 1
D2
B1
G1
E1
C1
A0
F0
D0
B-1
EXTRACTION AREAS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
IGNORE
BIT 7
BIT 6
BIT 5
BIT 4 (ALWAYS)
BIT 3
BIT 2
BIT 1 (BIT 8 - POLY MODE)
BIT 1 (POOL MODE)
3500
BITS
8 POLY MODE
7 TOM 1
6 TOM 2
5 TOM 3
4 HI-HAT
3 SNARE
2 KICK
1 NULL
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
ALWAYS
3502
ACTUAL VALUE POOLS:
POOL SIZE: 2 1 3 3 2 1 1 3 2 1 3 3 3 4 6 6
PATTERN STEPS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
HH = ALWAYS
MODE = POOL
3504

FIG. 35

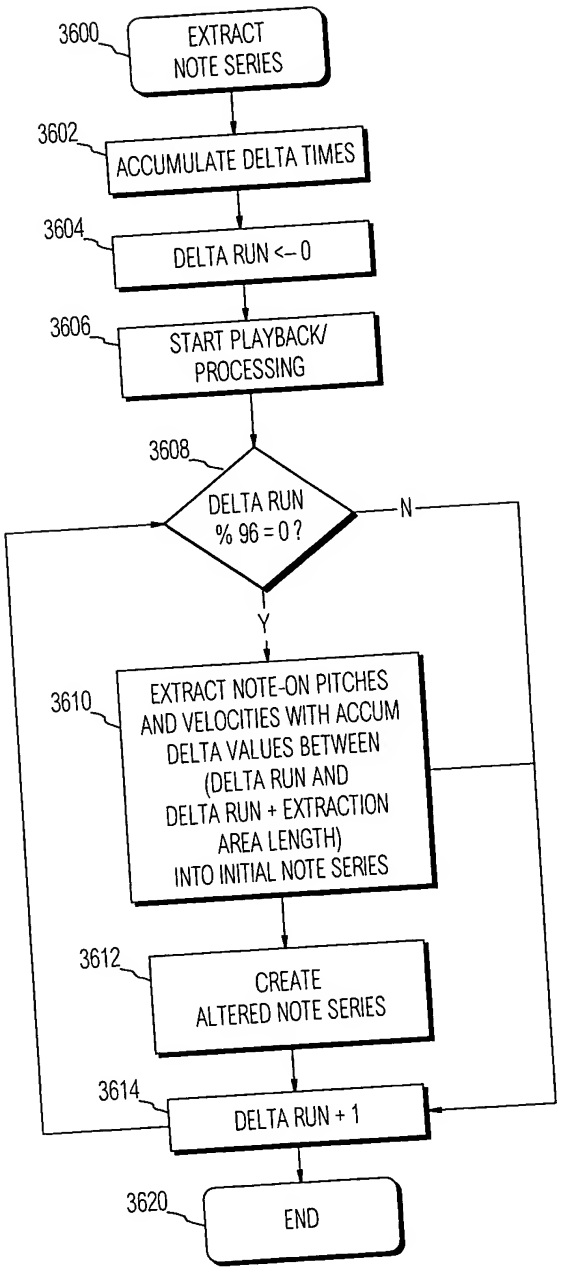

3600
EXTRACT NOTE SERIES
3602
ACCUMULATE DELTA TIMES
3604
DELTA RUN <-- 0
3606
START PLAYBACK/ PROCESSING
3608
DELTA RUN % 96 = 0 ?
N
Y
3610
EXTRACT NOTE-ON PITCHES AND VELOCITIES WITH ACCUM DELTA VALUES BETWEEN (DELTA RUN AND DELTA RUN + EXTRACTION AREA LENGTH) INTO INITIAL NOTE SERIES
3612
CREATE ALTERED NOTE SERIES
3614
DELTA RUN + 1
3620
END

FIG. 36

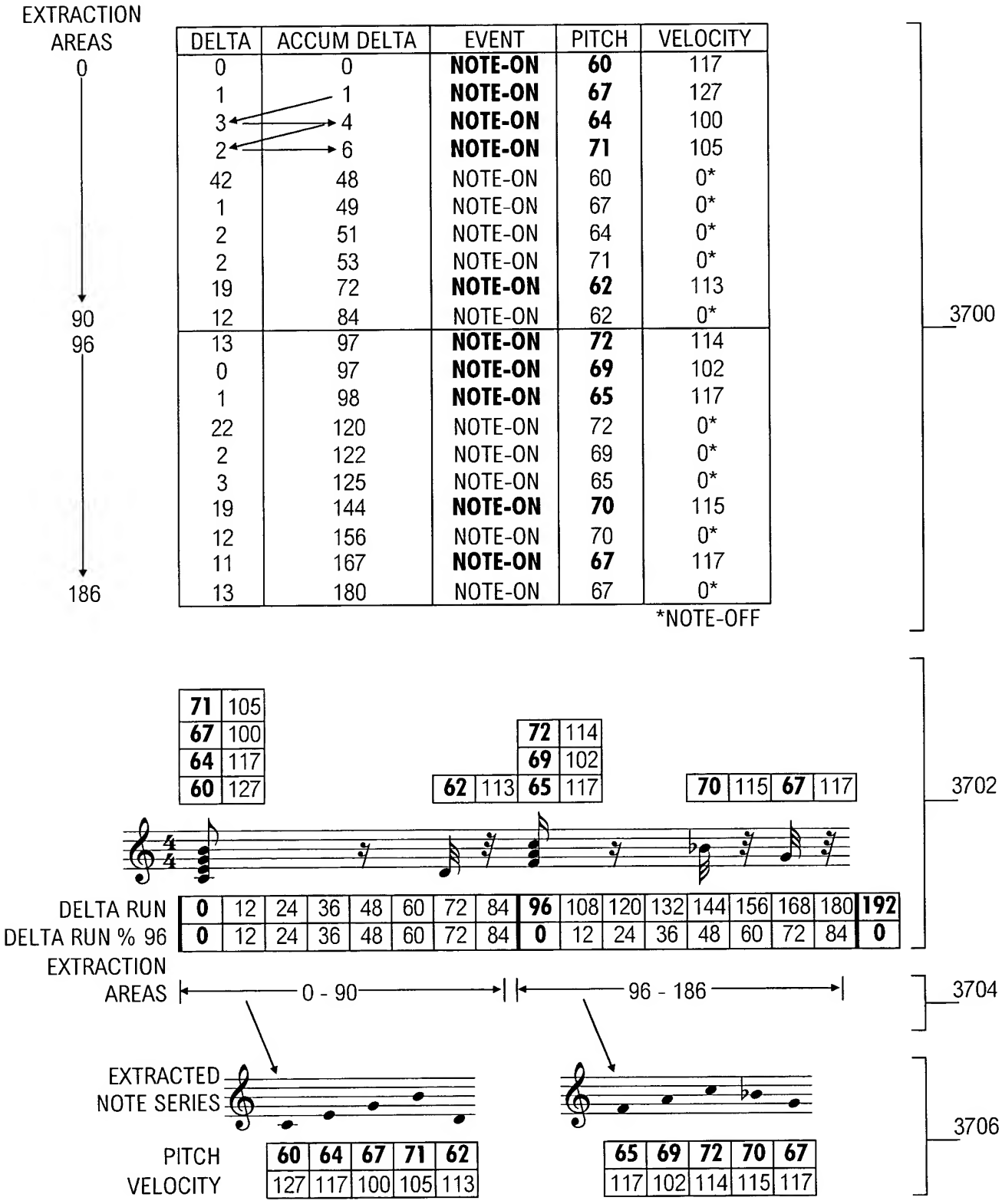

EXTRACTION AREAS
0
90
96
186
DELTA | ACCUM DELTA | EVENT | PITCH | VELOCITY
0 | 0 | NOTE-ON | 60 | 117
1 | 1 | NOTE-ON | 67 | 127
3 | 4 | NOTE-ON | 64 | 100
2 | 6 | NOTE-ON | 71 | 105
42 | 48 | NOTE-ON | 60 | 0*
1 | 49 | NOTE-ON | 67 | 0*
2 | 51 | NOTE-ON | 64 | 0*
2 | 53 | NOTE-ON | 71 | 0*
19 | 72 | NOTE-ON | 62 | 113
12 | 84 | NOTE-ON | 62 | 0*
13 | 97 | NOTE-ON | 72 | 114
0 | 97 | NOTE-ON | 69 | 102
1 | 98 | NOTE-ON | 65 | 117
22 | 120 | NOTE-ON | 72 | 0*
2 | 122 | NOTE-ON | 69 | 0*
3 | 125 | NOTE-ON | 65 | 0*
19 | 144 | NOTE-ON | 70 | 115
12 | 156 | NOTE-ON | 70 | 0*
11 | 167 | NOTE-ON | 67 | 117
13 | 180 | NOTE-ON | 67 | 0*
*NOTE-OFF
3700
71 105
67 100
64 117
60 127
72 114
69 102
62 113 65 117
70 115 67 117
3702
DELTA RUN 0 12 24 36 48 60 72 84 96 108 120 132 144 156 168 180 192
DELTA RUN % 96 0 12 24 36 48 60 72 84 0 12 24 36 48 60 72 84 0
EXTRACTION AREAS
0 - 90
96 - 186
3704
EXTRACTED NOTE SERIES
PITCH 60 64 67 71 62
VELOCITY 127 117 100 105 113
65 69 72 70 67
117 102 114 115 117
3706

FIG. 37

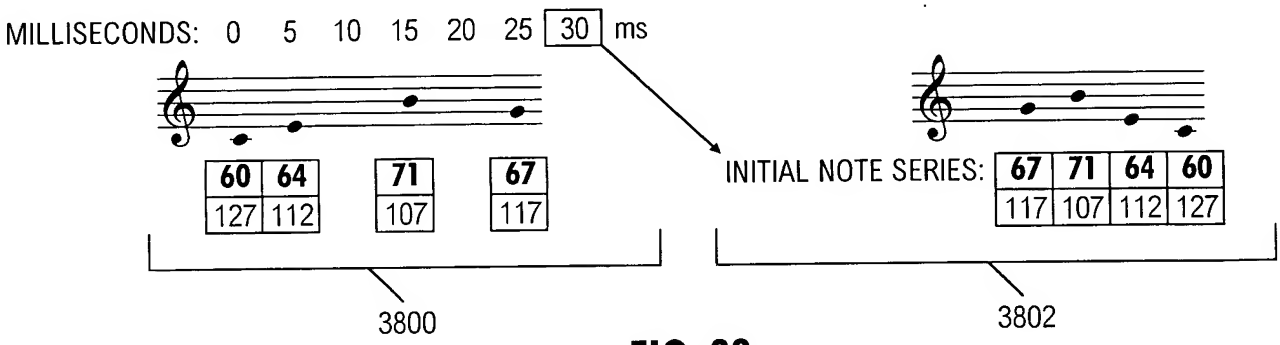


FIG. 38

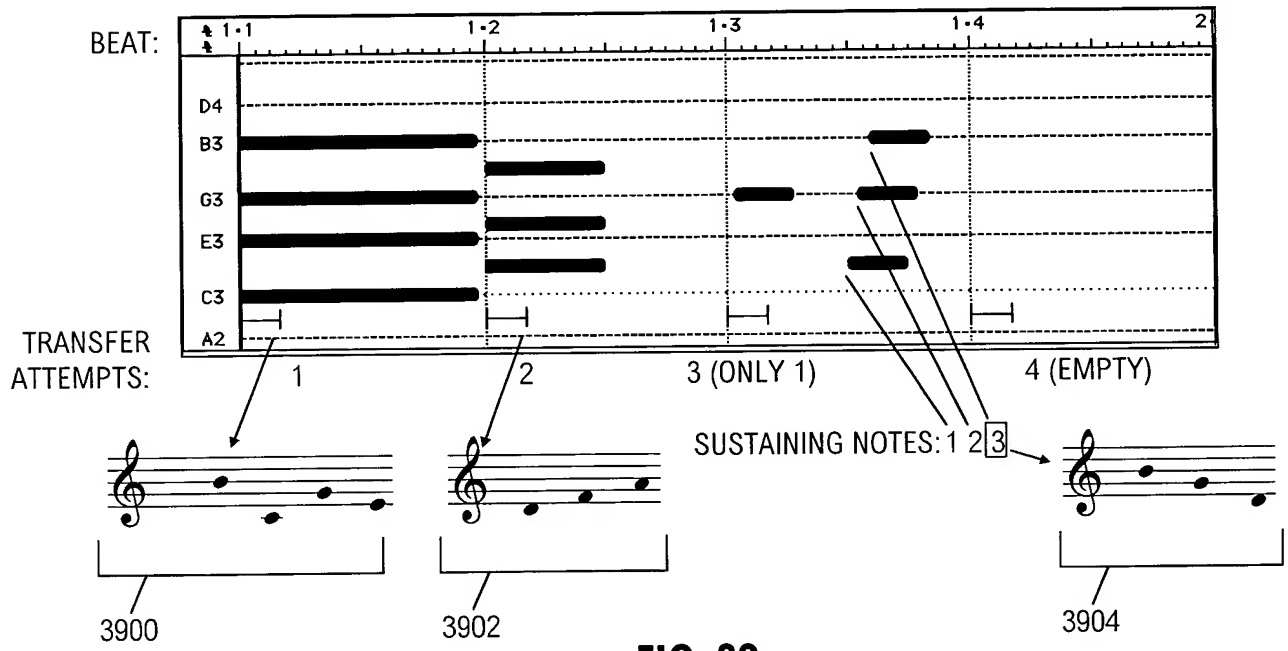


FIG. 39

ORIGINAL PITCH:	40	47	52	56	59	64
PITCH:	40	47	52	56	59	64
VELOCITY:	117	127	127	107	115	118
DAL ID:	1	2	3	4	5	6

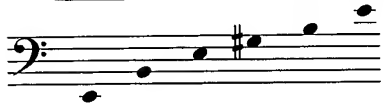


FIG. 40

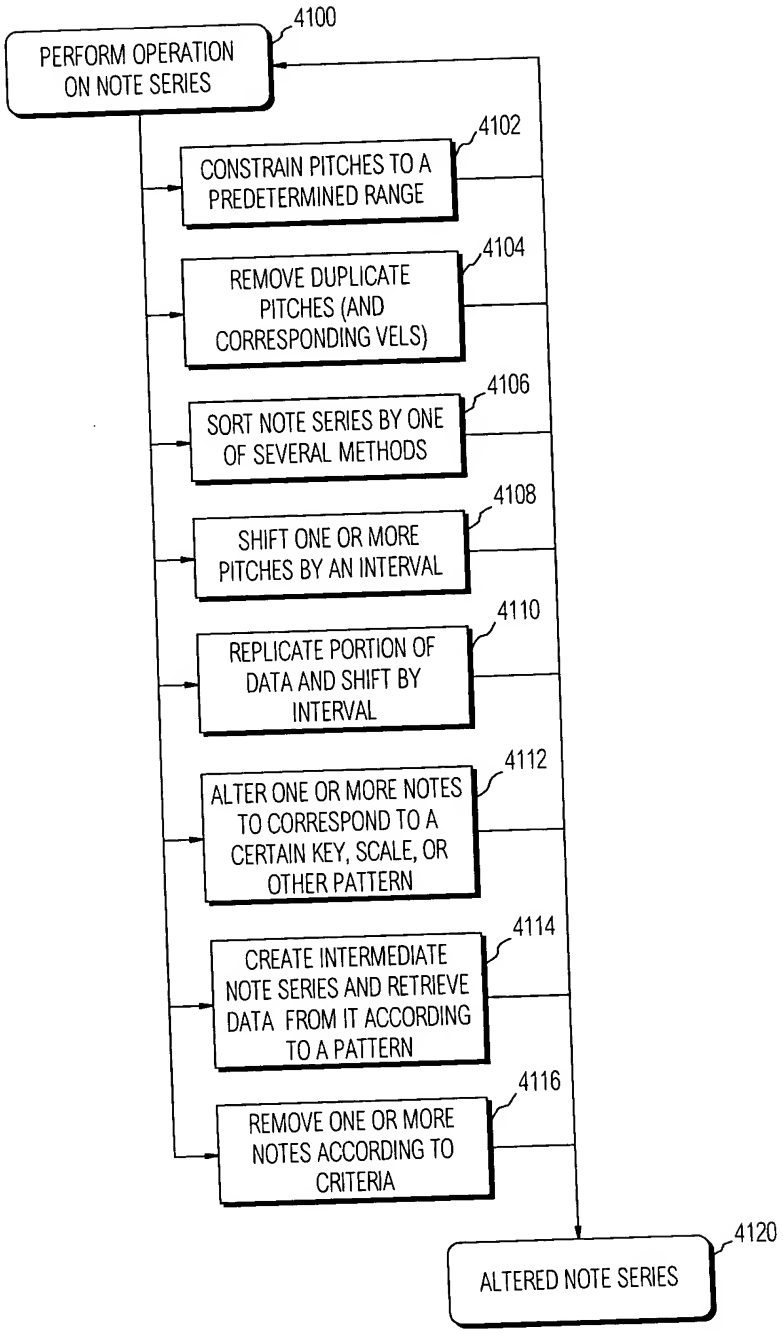

PERFORM OPERATION ON NOTE SERIES
4100
CONSTRAIN PITCHES TO A PREDETERMINED RANGE
4102
REMOVE DUPLICATE PITCHES (AND CORRESPONDING VELS)
4104
SORT NOTE SERIES BY ONE OF SEVERAL METHODS
4106
SHIFT ONE OR MORE PITCHES BY AN INTERVAL
4108
REPLICATE PORTION OF DATA AND SHIFT BY INTERVAL
4110
ALTER ONE OR MORE NOTES TO CORRESPOND TO A CERTAIN KEY, SCALE, OR OTHER PATTERN
4112
CREATE INTERMEDIATE NOTE SERIES AND RETRIEVE DATA FROM IT ACCORDING TO A PATTERN
4114
REMOVE ONE OR MORE NOTES ACCORDING TO CRITERIA
4116
ALTERED NOTE SERIES
4120

FIG. 41

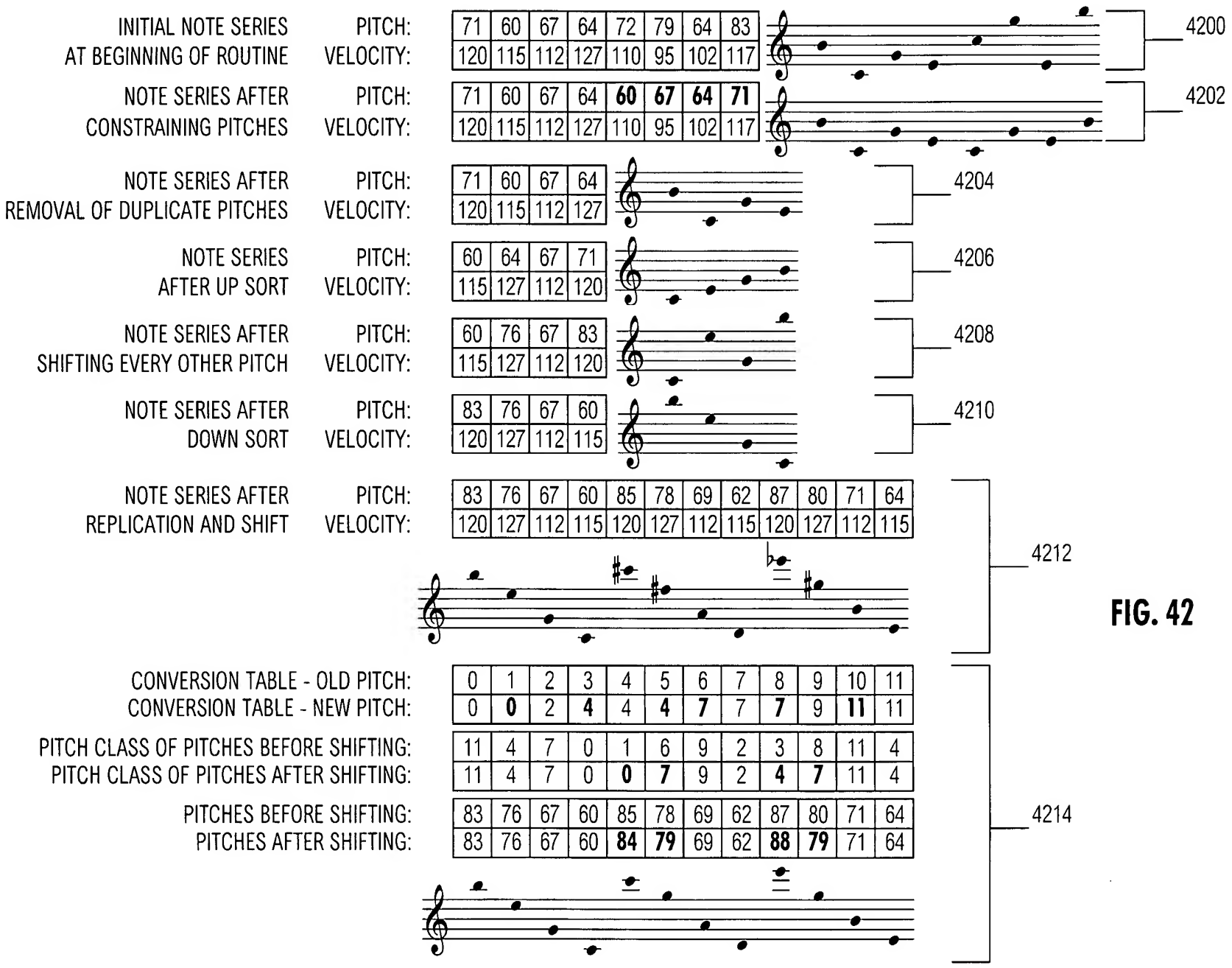

INITIAL NOTE SERIES AT BEGINNING OF ROUTINE
PITCH: 71 60 67 64 72 79 64 83
VELOCITY: 120 115 112 127 110 95 102 117
4200
NOTE SERIES AFTER CONSTRAINING PITCHES
PITCH: 71 60 67 64 60 67 64 71
VELOCITY: 120 115 112 127 110 95 102 117
4202
NOTE SERIES AFTER REMOVAL OF DUPLICATE PITCHES
PITCH: 71 60 67 64
VELOCITY: 120 115 112 127
4204
NOTE SERIES AFTER UP SORT
PITCH: 60 64 67 71
VELOCITY: 115 127 112 120
4206
NOTE SERIES AFTER SHIFTING EVERY OTHER PITCH
PITCH: 60 76 67 83
VELOCITY: 115 127 112 120
4208
NOTE SERIES AFTER DOWN SORT
PITCH: 83 76 67 60
VELOCITY: 120 127 112 115
4210
NOTE SERIES AFTER REPLICATION AND SHIFT
PITCH: 83 76 67 60 85 78 69 62 87 80 71 64
VELOCITY: 120 127 112 115 120 127 112 115 120 127 112 115
4212
CONVERSION TABLE - OLD PITCH: 0 1 2 3 4 5 6 7 8 9 10 11
CONVERSION TABLE - NEW PITCH: 0 0 2 4 4 4 7 7 7 9 11 11
PITCH CLASS OF PITCHES BEFORE SHIFTING: 11 4 7 0 1 6 9 2 3 8 11 4
PITCH CLASS OF PITCHES AFTER SHIFTING: 11 4 7 0 0 7 9 2 4 7 11 4
PITCHES BEFORE SHIFTING: 83 76 67 60 85 78 69 62 87 80 71 64
PITCHES AFTER SHIFTING: 83 76 67 60 84 79 69 62 88 79 71 64
4214

FIG. 42

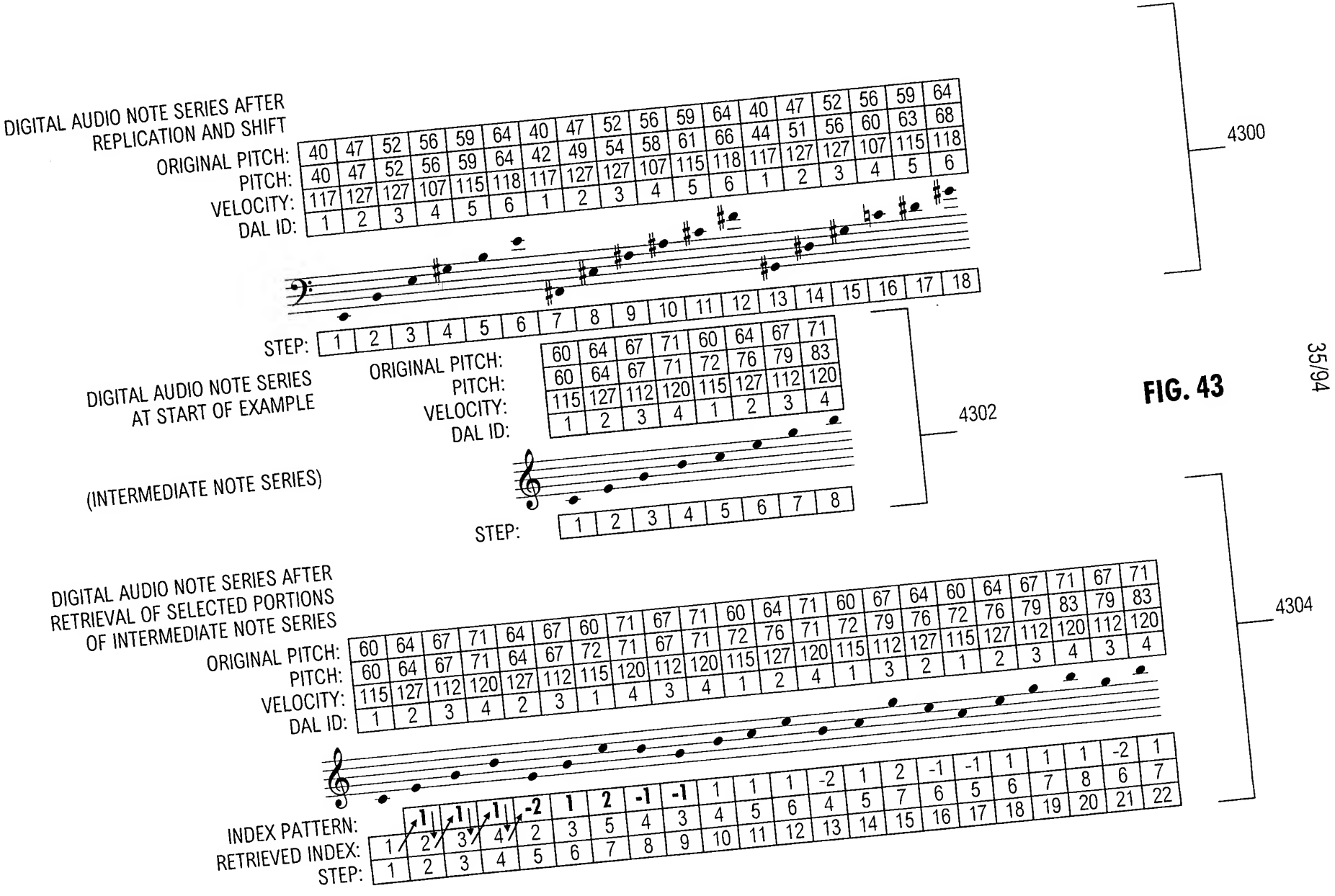

DIGITAL AUDIO NOTE SERIES AFTER REPLICATION AND SHIFT
ORIGINAL PITCH: 40 47 52 56 59 64 40 47 52 56 59 64 40 47 52 56 59 64
PITCH: 40 47 52 56 59 64 42 49 54 58 61 66 44 51 56 60 63 68
VELOCITY: 117 127 127 107 115 118 117 127 127 107 115 118 117 127 127 107 115 118
DAL ID: 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6
STEP: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
4300
DIGITAL AUDIO NOTE SERIES AT START OF EXAMPLE
ORIGINAL PITCH: 60 64 67 71 60 64 67 71
PITCH: 60 64 67 71 72 76 79 83
VELOCITY: 115 127 112 120 115 127 112 120
DAL ID: 1 2 3 4 1 2 3 4
(INTERMEDIATE NOTE SERIES)
STEP: 1 2 3 4 5 6 7 8
4302
DIGITAL AUDIO NOTE SERIES AFTER RETRIEVAL OF SELECTED PORTIONS OF INTERMEDIATE NOTE SERIES
ORIGINAL PITCH: 60 64 67 71 64 67 60 71 67 71 60 64 71 60 67 64 60 64 67 71 67 71
PITCH: 60 64 67 71 64 67 72 71 67 71 72 76 71 72 79 76 72 76 79 83 79 83
VELOCITY: 115 127 112 120 127 112 115 120 112 120 115 127 120 115 112 127 115 127 112 120 112 120
DAL ID: 1 2 3 4 2 3 1 4 3 4 1 2 4 1 3 2 1 2 3 4 3 4
INDEX PATTERN: 1 1 1 -2 1 2 -1 -1 1 1 1 -2 1 2 -1 -1 1 1 1 -2 1
RETRIEVED INDEX: 1 2 3 4 2 3 5 4 3 4 5 6 4 5 7 6 5 6 7 8 6 7
STEP: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
4304

FIG. 43

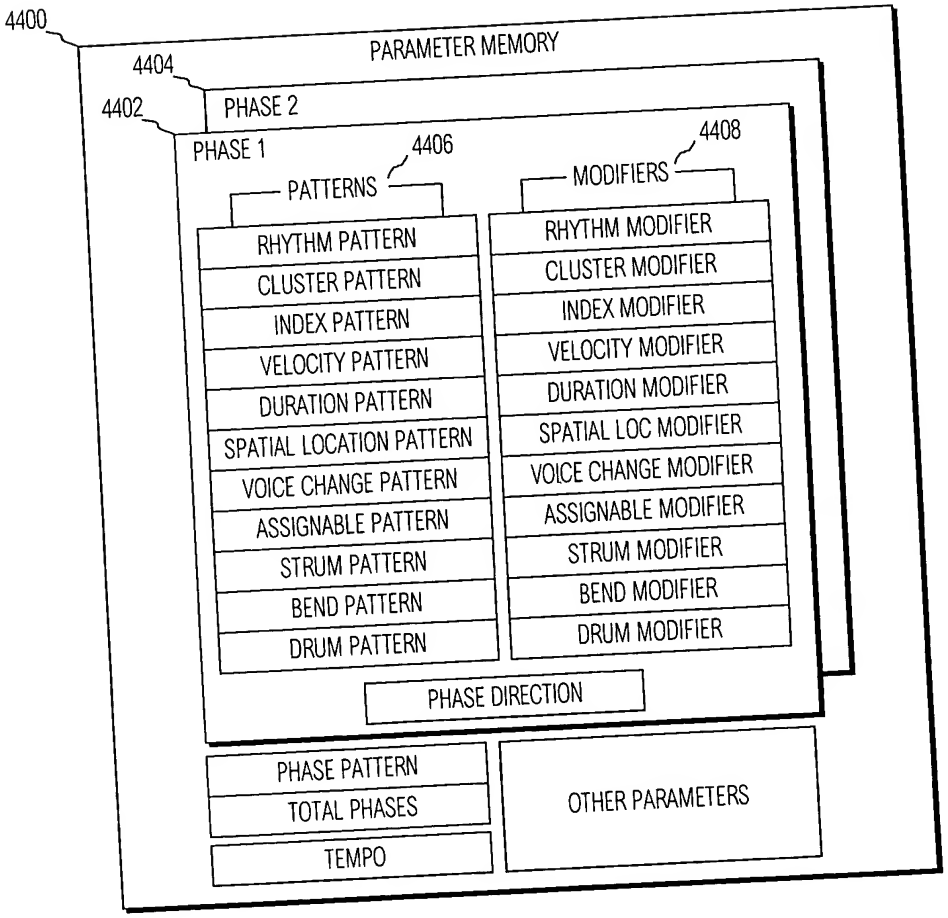

4400
PARAMETER MEMORY
4404
PHASE 2
4402
PHASE 1
4406
PATTERNS
4408
MODIFIERS
RHYTHM PATTERN
CLUSTER PATTERN
INDEX PATTERN
VELOCITY PATTERN
DURATION PATTERN
SPATIAL LOCATION PATTERN
VOICE CHANGE PATTERN
ASSIGNABLE PATTERN
STRUM PATTERN
BEND PATTERN
DRUM PATTERN
RHYTHM MODIFIER
CLUSTER MODIFIER
INDEX MODIFIER
VELOCITY MODIFIER
DURATION MODIFIER
SPATIAL LOC MODIFIER
VOICE CHANGE MODIFIER
ASSIGNABLE MODIFIER
STRUM MODIFIER
BEND MODIFIER
DRUM MODIFIER
PHASE DIRECTION
PHASE PATTERN
TOTAL PHASES
TEMPO
OTHER PARAMETERS

FIG. 44

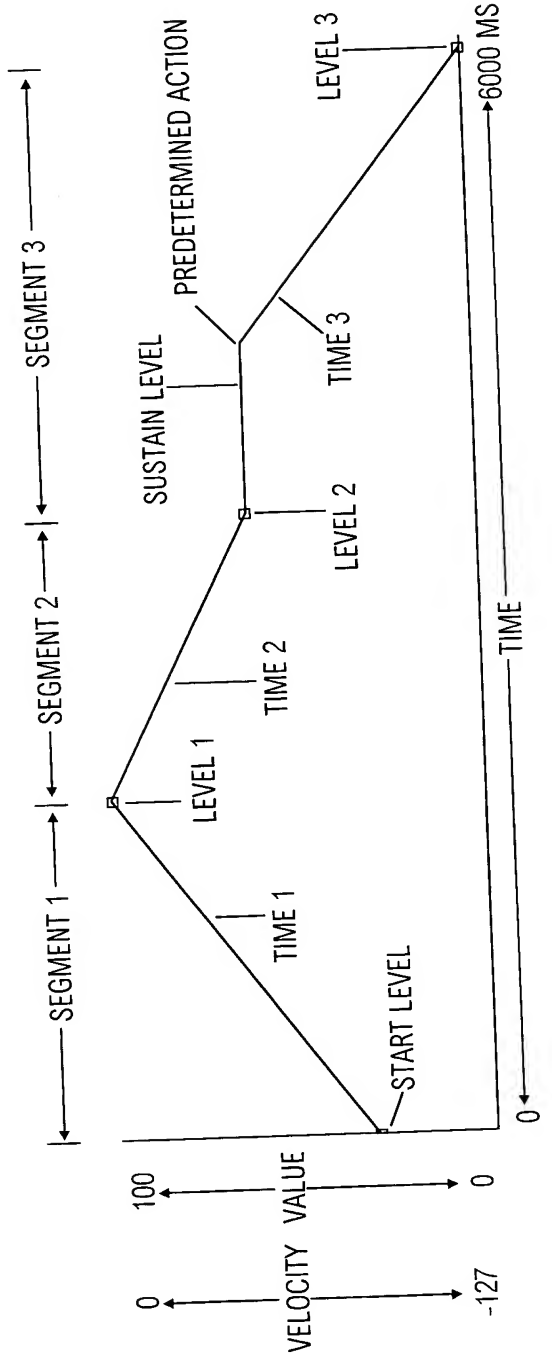

SEGMENT 1
SEGMENT 2
SEGMENT 3
SUSTAIN LEVEL
PREDETERMINED ACTION
LEVEL 1
LEVEL 2
LEVEL 3
TIME 1
TIME 2
TIME 3
START LEVEL
6000 MS
TIME
0
100
0
VELOCITY VALUE
0
-127

FIG. 45

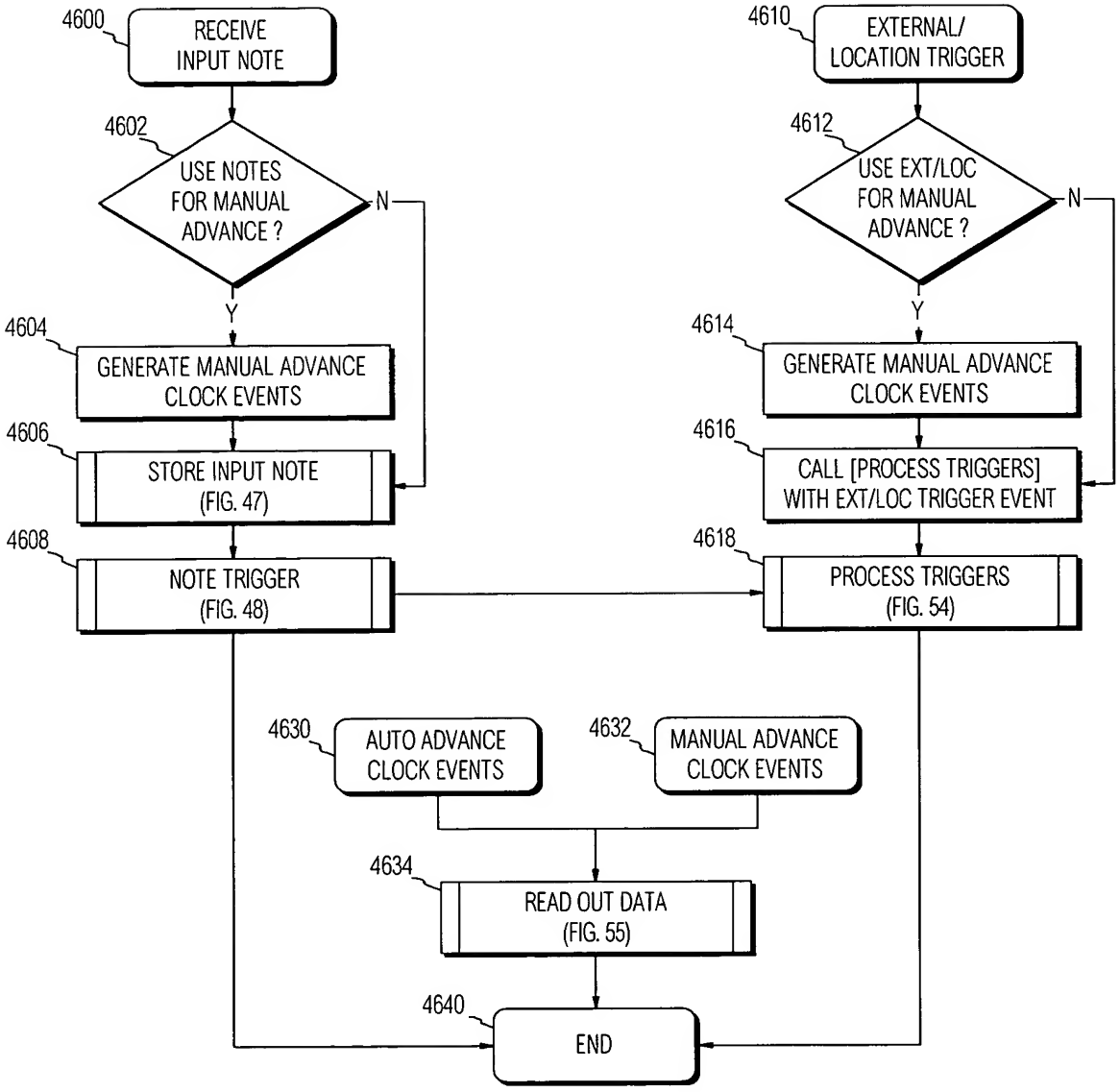

4600
RECEIVE INPUT NOTE
4602
USE NOTES FOR MANUAL ADVANCE ?
N
Y
4604
GENERATE MANUAL ADVANCE CLOCK EVENTS
4606
STORE INPUT NOTE (FIG. 47)
4608
NOTE TRIGGER (FIG. 48)
4610
EXTERNAL/ LOCATION TRIGGER
4612
USE EXT/LOC FOR MANUAL ADVANCE ?
N
Y
4614
GENERATE MANUAL ADVANCE CLOCK EVENTS
4616
CALL [PROCESS TRIGGERS] WITH EXT/LOC TRIGGER EVENT
4618
PROCESS TRIGGERS (FIG. 54)
4630
AUTO ADVANCE CLOCK EVENTS
4632
MANUAL ADVANCE CLOCK EVENTS
4634
READ OUT DATA (FIG. 55)
4640
END

FIG. 46

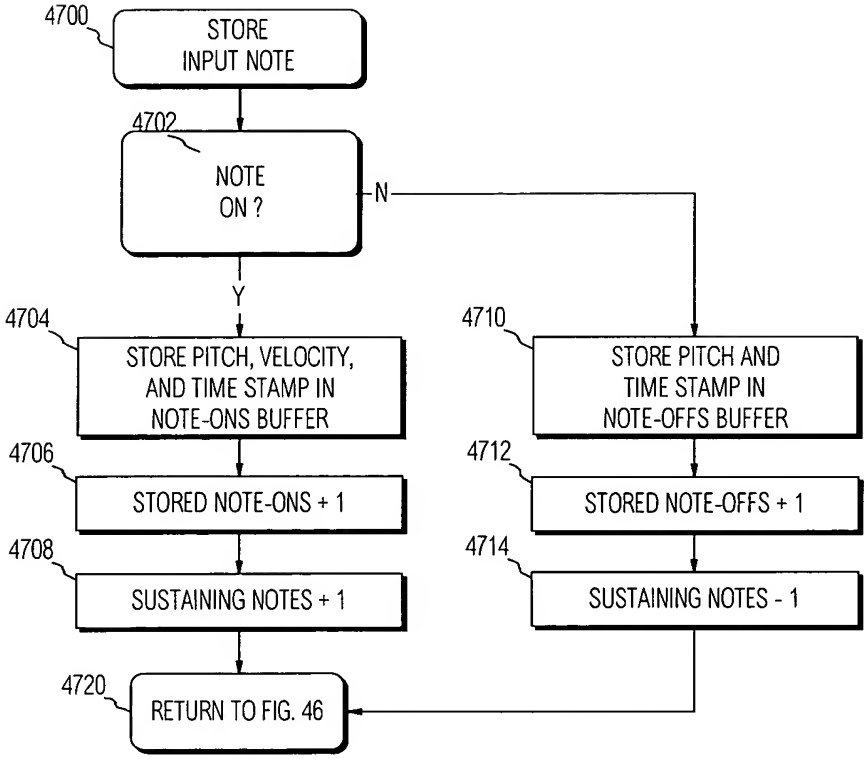

4700
STORE INPUT NOTE
4702
NOTE ON ?
N
Y
4704
STORE PITCH, VELOCITY, AND TIME STAMP IN NOTE-ONS BUFFER
4706
STORED NOTE-ONS + 1
4708
SUSTAINING NOTES + 1
4710
STORE PITCH AND TIME STAMP IN NOTE-OFFS BUFFER
4712
STORED NOTE-OFFS + 1
4714
SUSTAINING NOTES - 1
4720
RETURN TO FIG. 46

FIG. 47

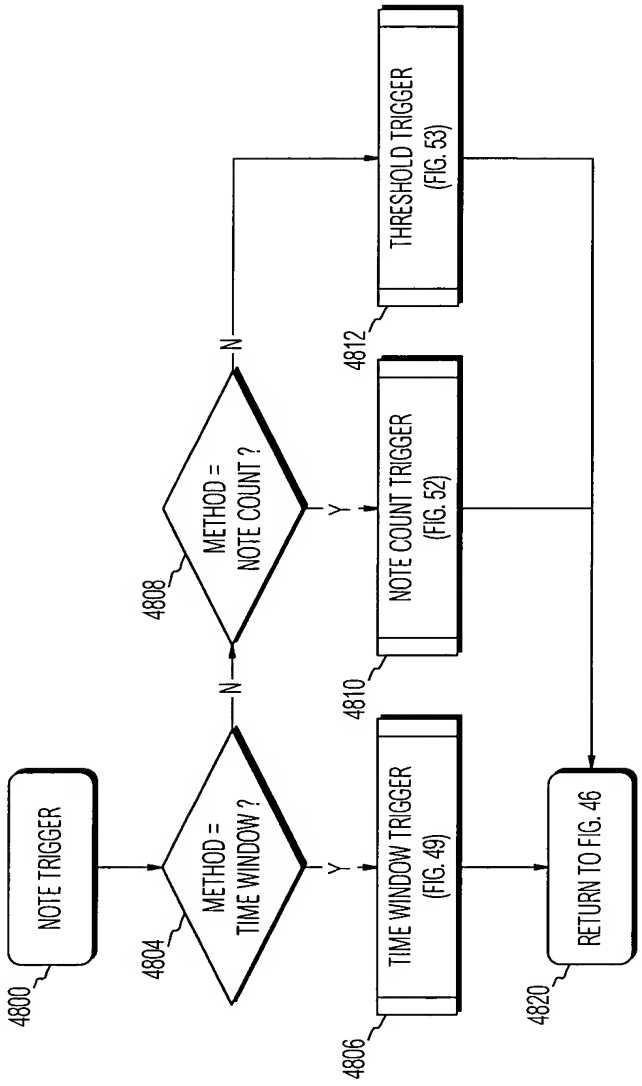

NOTE TRIGGER
4800
METHOD = TIME WINDOW ?
4804
Y
N
TIME WINDOW TRIGGER (FIG. 49)
4806
METHOD = NOTE COUNT ?
4808
Y
N
NOTE COUNT TRIGGER (FIG. 52)
4810
THRESHOLD TRIGGER (FIG. 53)
4812
RETURN TO FIG. 46
4820

FIG. 48

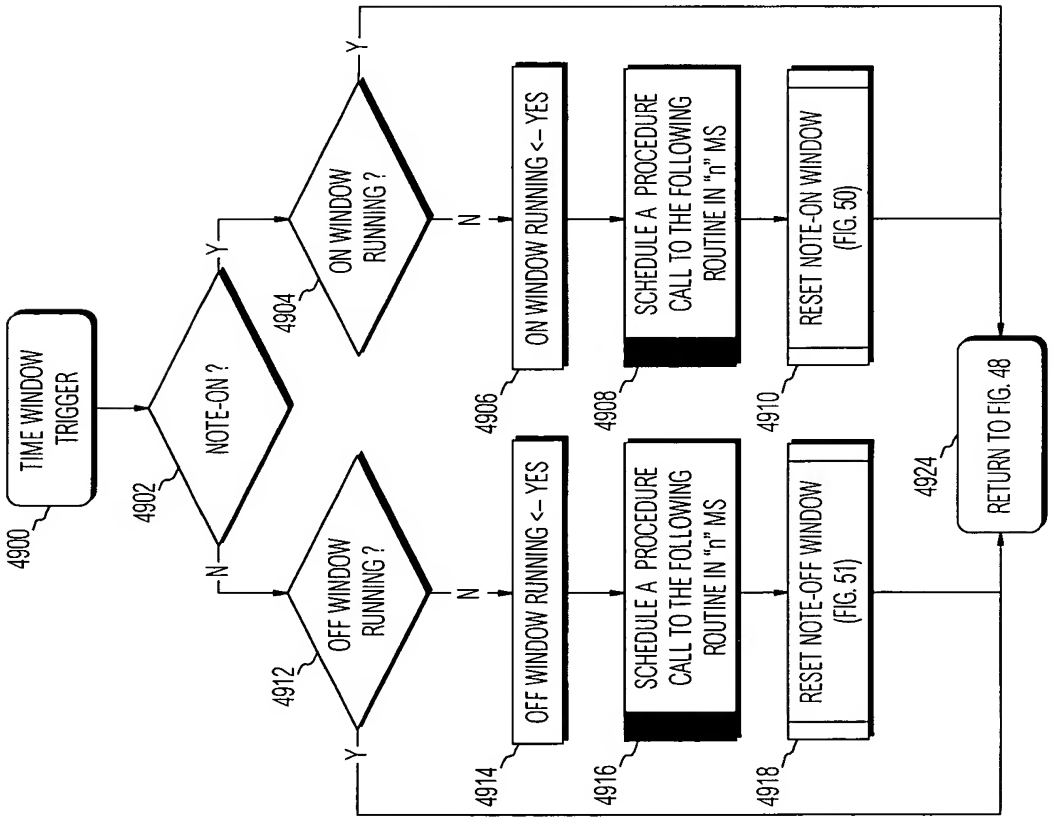


FIG. 49

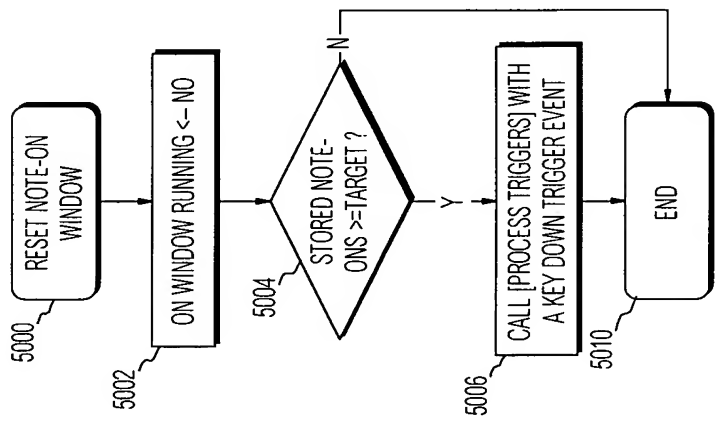


FIG. 50

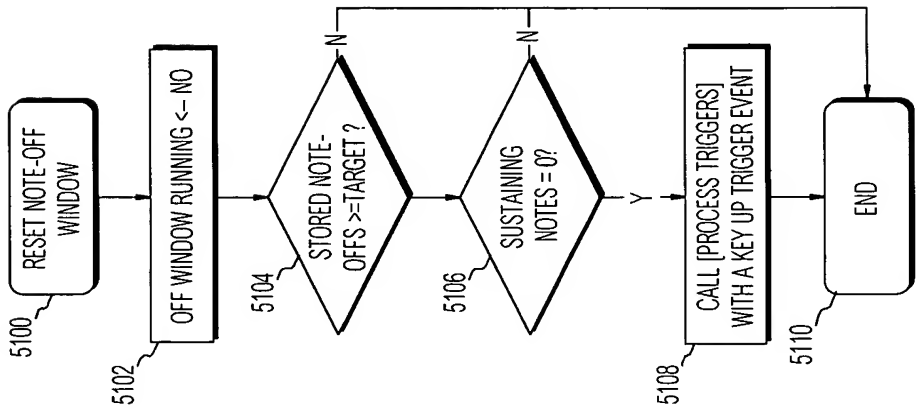


FIG. 51

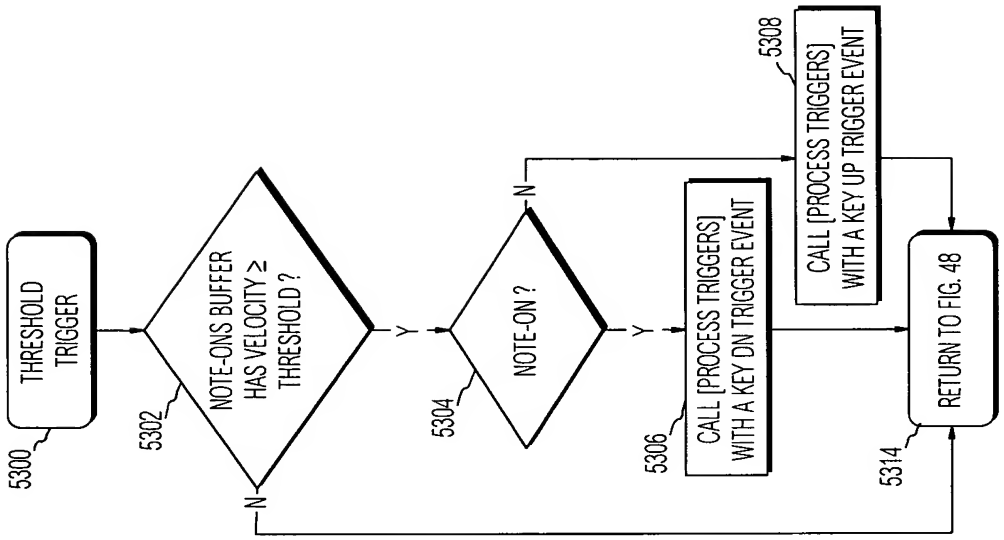

5300
THRESHOLD TRIGGER
5302
NOTE-ONS BUFFER HAS VELOCITY ≥ THRESHOLD ?
Y
N
5304
NOTE-ON ?
Y
N
5306
CALL [PROCESS TRIGGERS] WITH A KEY DN TRIGGER EVENT
5308
CALL [PROCESS TRIGGERS] WITH A KEY UP TRIGGER EVENT
5314
RETURN TO FIG. 48

FIG. 53

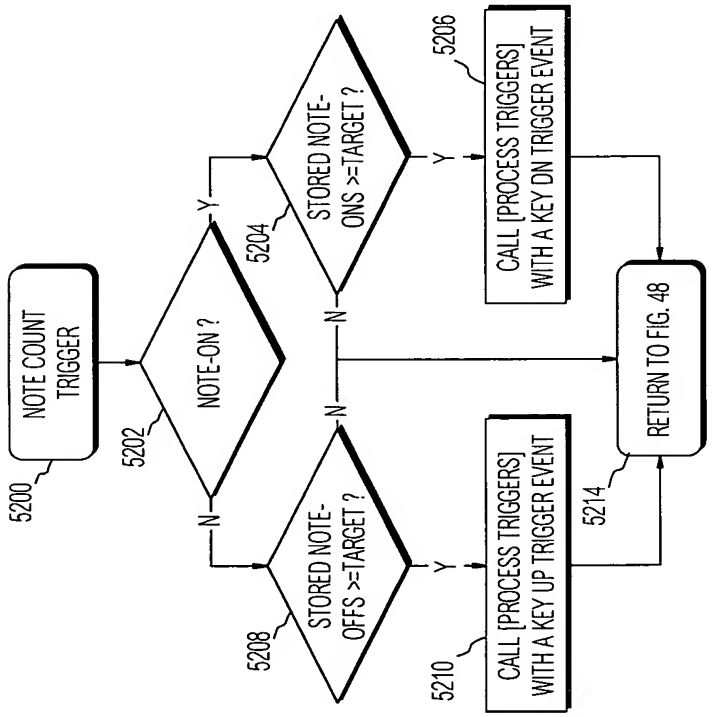

5200
NOTE COUNT TRIGGER
5202
NOTE-ON ?
Y
N
5204
STORED NOTE-ONS >=TARGET ?
Y
N
5206
CALL [PROCESS TRIGGERS] WITH A KEY DN TRIGGER EVENT
5208
STORED NOTE-OFFS >=TARGET ?
Y
N
5210
CALL [PROCESS TRIGGERS] WITH A KEY UP TRIGGER EVENT
5214
RETURN TO FIG. 48

FIG. 52

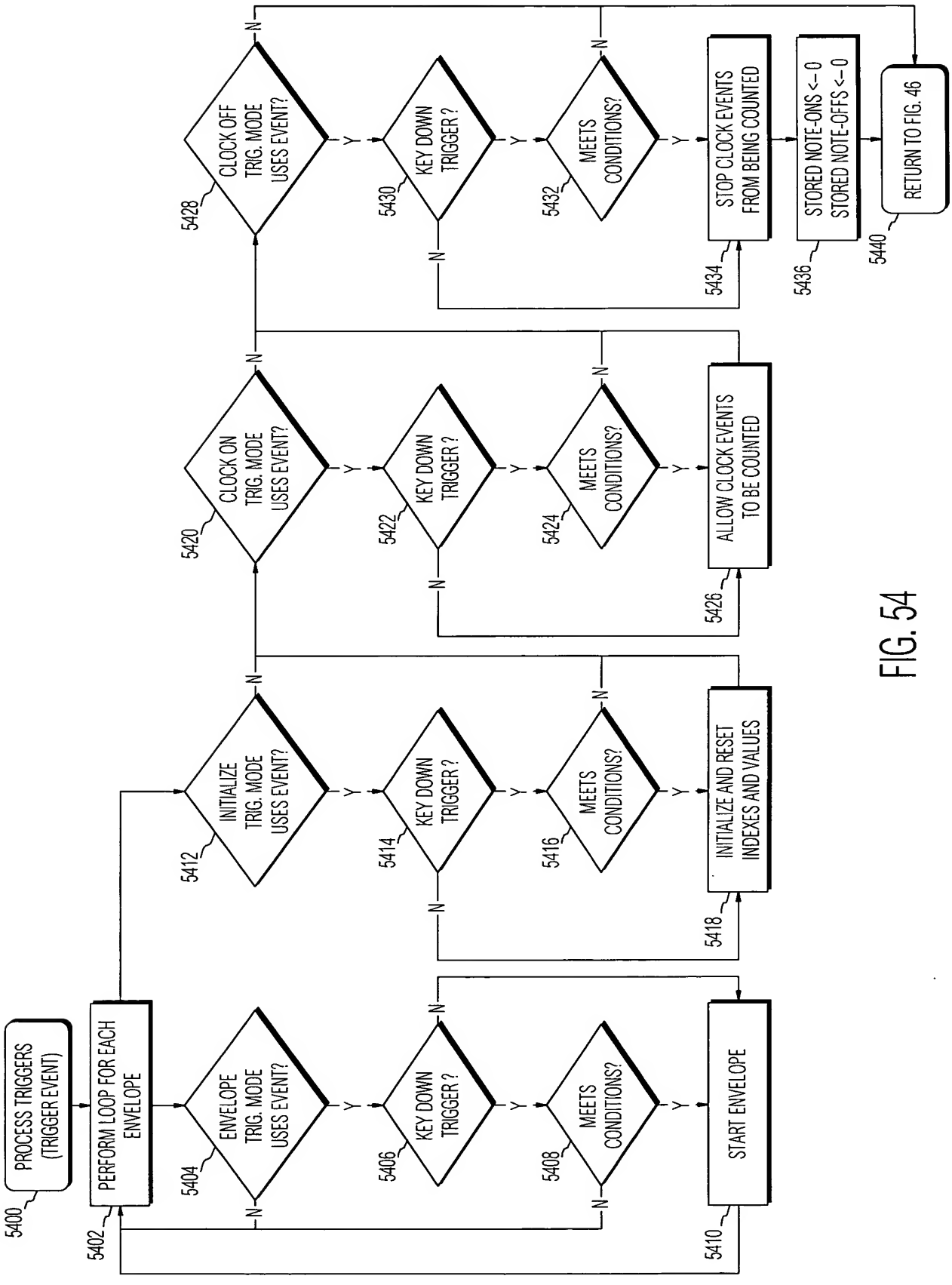

5400
PROCESS TRIGGERS (TRIGGER EVENT)
5402
PERFORM LOOP FOR EACH ENVELOPE
5404
ENVELOPE TRIG. MODE USES EVENT?
5406
KEY DOWN TRIGGER ?
5408
MEETS CONDITIONS?
5410
START ENVELOPE
5412
INITIALIZE TRIG. MODE USES EVENT?
5414
KEY DOWN TRIGGER ?
5416
MEETS CONDITIONS?
5418
INITIALIZE AND RESET INDEXES AND VALUES
5420
CLOCK ON TRIG. MODE USES EVENT?
5422
KEY DOWN TRIGGER ?
5424
MEETS CONDITIONS?
5426
ALLOW CLOCK EVENTS TO BE COUNTED
5428
CLOCK OFF TRIG. MODE USES EVENT?
5430
KEY DOWN TRIGGER ?
5432
MEETS CONDITIONS?
5434
STOP CLOCK EVENTS FROM BEING COUNTED
5436
STORED NOTE-ONS <-- 0
STORED NOTE-OFFS <-- 0
5440
RETURN TO FIG. 46
Y
N

FIG. 54

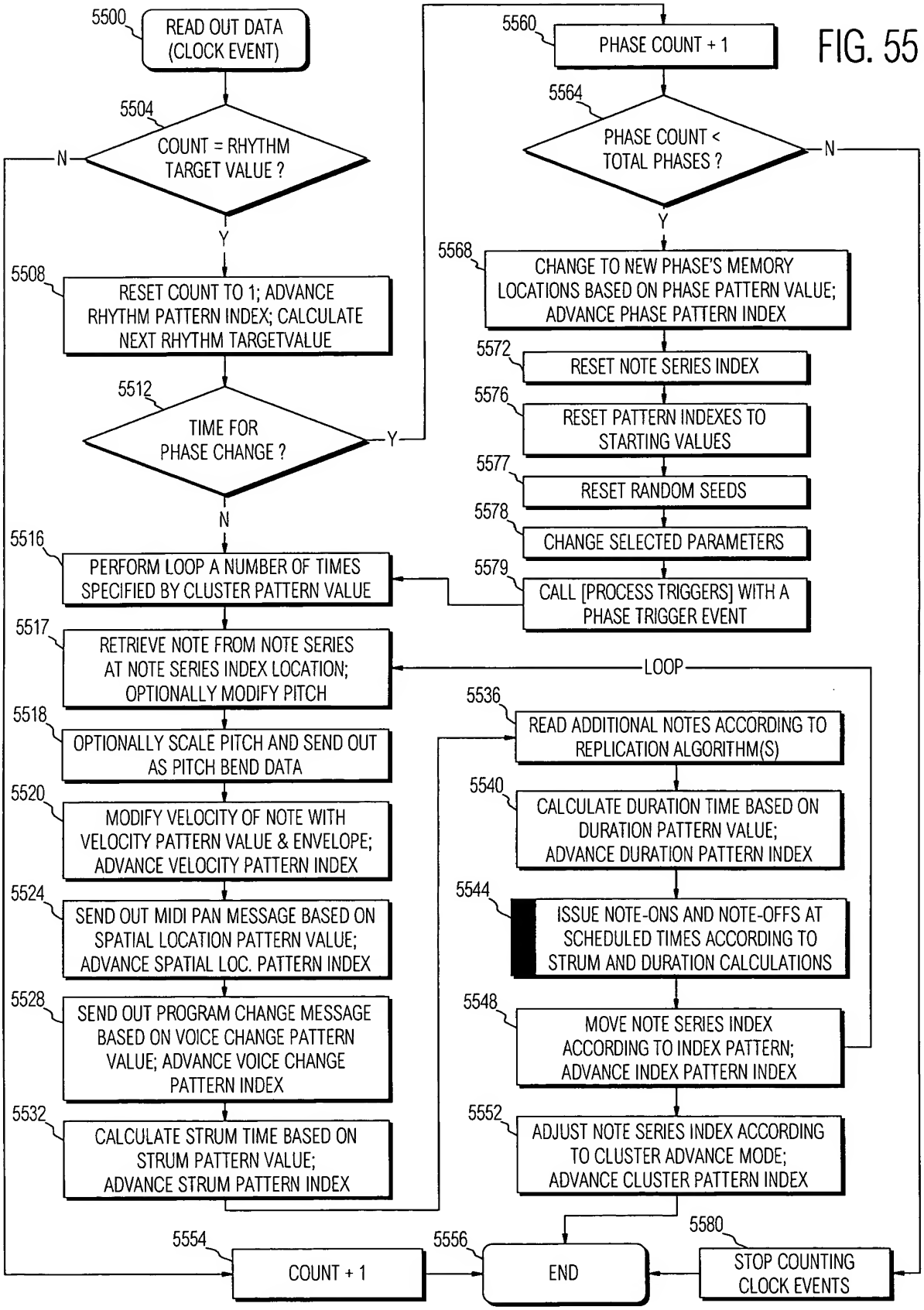
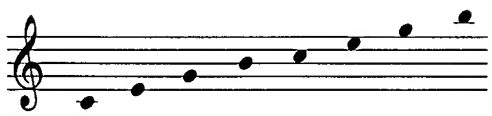

5500
READ OUT DATA (CLOCK EVENT)
5504
COUNT = RHYTHM TARGET VALUE ?
N
Y
5508
RESET COUNT TO 1; ADVANCE RHYTHM PATTERN INDEX; CALCULATE NEXT RHYTHM TARGETVALUE
5512
TIME FOR PHASE CHANGE ?
Y
N
5516
PERFORM LOOP A NUMBER OF TIMES SPECIFIED BY CLUSTER PATTERN VALUE
5517
RETRIEVE NOTE FROM NOTE SERIES AT NOTE SERIES INDEX LOCATION; OPTIONALLY MODIFY PITCH
5518
OPTIONALLY SCALE PITCH AND SEND OUT AS PITCH BEND DATA
5520
MODIFY VELOCITY OF NOTE WITH VELOCITY PATTERN VALUE & ENVELOPE; ADVANCE VELOCITY PATTERN INDEX
5524
SEND OUT MIDI PAN MESSAGE BASED ON SPATIAL LOCATION PATTERN VALUE; ADVANCE SPATIAL LOC. PATTERN INDEX
5528
SEND OUT PROGRAM CHANGE MESSAGE BASED ON VOICE CHANGE PATTERN VALUE; ADVANCE VOICE CHANGE PATTERN INDEX
5532
CALCULATE STRUM TIME BASED ON STRUM PATTERN VALUE; ADVANCE STRUM PATTERN INDEX
5536
READ ADDITIONAL NOTES ACCORDING TO REPLICATION ALGORITHM(S)
5540
CALCULATE DURATION TIME BASED ON DURATION PATTERN VALUE; ADVANCE DURATION PATTERN INDEX
5544
ISSUE NOTE-ONS AND NOTE-OFFS AT SCHEDULED TIMES ACCORDING TO STRUM AND DURATION CALCULATIONS
5548
MOVE NOTE SERIES INDEX ACCORDING TO INDEX PATTERN; ADVANCE INDEX PATTERN INDEX
5552
ADJUST NOTE SERIES INDEX ACCORDING TO CLUSTER ADVANCE MODE; ADVANCE CLUSTER PATTERN INDEX
LOOP
5554
COUNT + 1
5556
END
5580
STOP COUNTING CLOCK EVENTS
5560
PHASE COUNT + 1
5564
PHASE COUNT < TOTAL PHASES ?
N
Y
5568
CHANGE TO NEW PHASE'S MEMORY LOCATIONS BASED ON PHASE PATTERN VALUE; ADVANCE PHASE PATTERN INDEX
5572
RESET NOTE SERIES INDEX
5576
RESET PATTERN INDEXES TO STARTING VALUES
5577
RESET RANDOM SEEDS
5578
CHANGE SELECTED PARAMETERS
5579
CALL [PROCESS TRIGGERS] WITH A PHASE TRIGGER EVENT

FIG. 55

NOTE SERIES PITCH:	60	64	67	71	72	76	79	83
NOTE SERIES VELOCITY:	115	127	112	120	115	127	112	120
STEPS:	1	2	3	4	5	6	7	8



5600

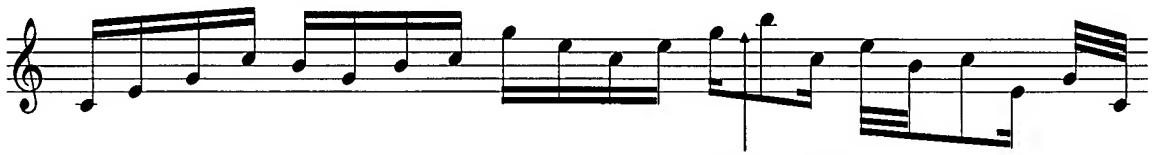
FIG. 56

PHASE 1								
RHYTHM PATTERN:	6							
CLUSTER PATTERN:	1							
VELOCITY PATTERN:	0	-20						
INDEX PATTERN:	1	1	2	-1	-1			
SPATIAL LOC. PATTERN:	0	32	64	96	127	96	64	32

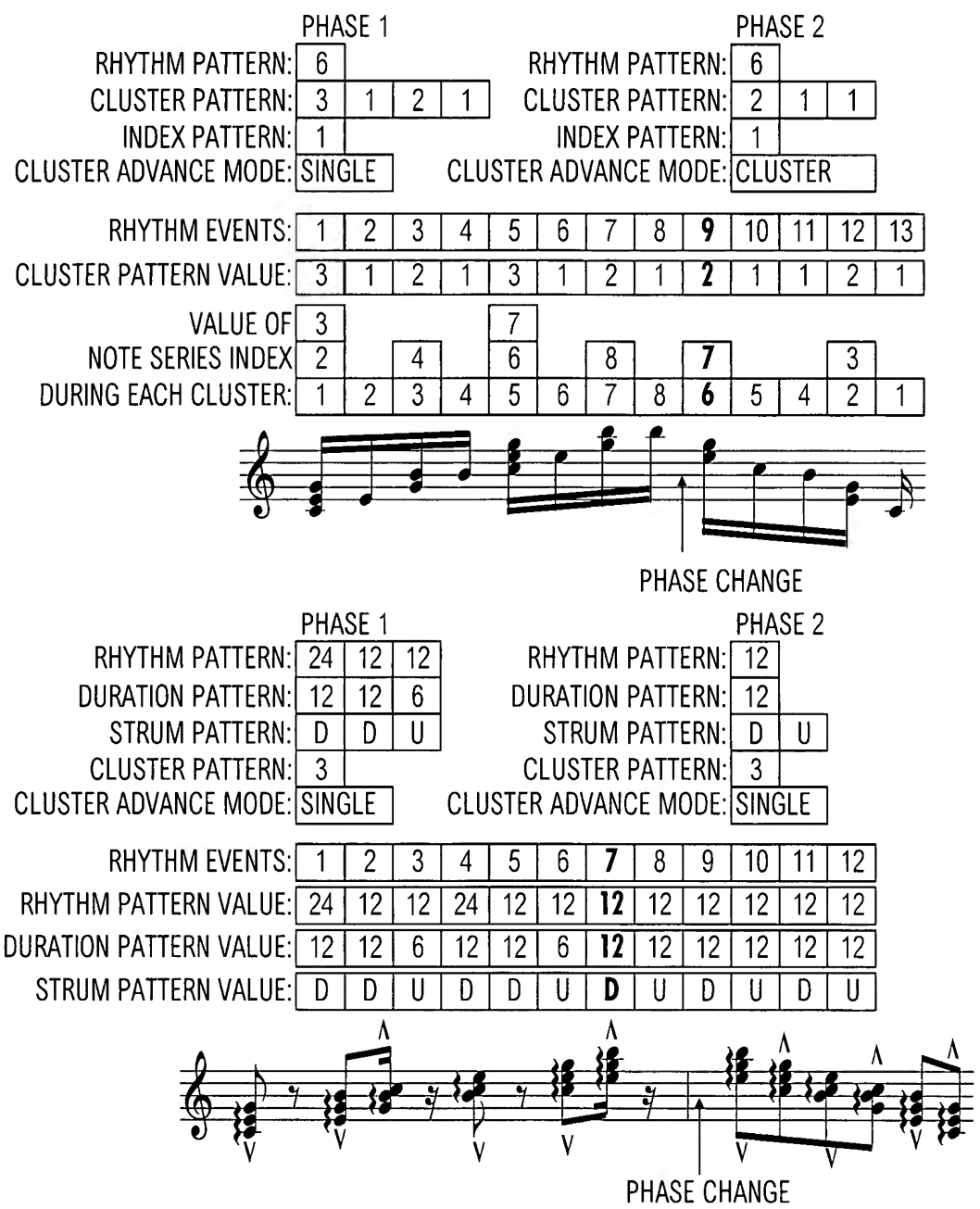
PHASE 2				
RHYTHM PATTERN:	12	6	3	3
CLUSTER PATTERN:	1			
VELOCITY PATTERN:	0	-10	-20	
INDEX PATTERN:	3	-1	2	-1
SPATIAL LOC. PATTERN:	0	127		

5602

RHYTHM EVENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	**14**	15	16	17	18	19	20	21
RHYTHM PATTERN VALUE:	6	6	6	6	6	6	6	6	6	6	6	6	6	**12**	6	3	3	12	6	3	3
INDEX PATTERN VALUE:		1	1	2	-1	-1	1	1	2	-1	-1	1	1	**2**	3	-1	2	-1	3	-1	-2
NOTE SERIES INDEX:	1	2	3	5	4	3	4	5	7	6	5	6	7	**8**	5	6	4	5	2	3	1
RETRIEVED PITCH:	60	64	67	72	71	67	71	72	79	76	72	76	79	**83**	72	76	71	72	64	67	60
VELOCITY PATTERN VALUE:	0	-20	0	-20	0	-20	0	-20	0	-20	0	-20	0	**0**	-10	-20	0	-10	-20	0	-10
GENERATED VELOCITY:	115	107	112	95	120	92	120	95	112	107	115	107	112	**120**	105	107	120	105	107	112	105
PAN:	0	32	64	96	127	96	64	32	0	32	64	96	127	**0**	127	0	127	0	127	0	127



5604



5700

5702

5704

5706

FIG. 57

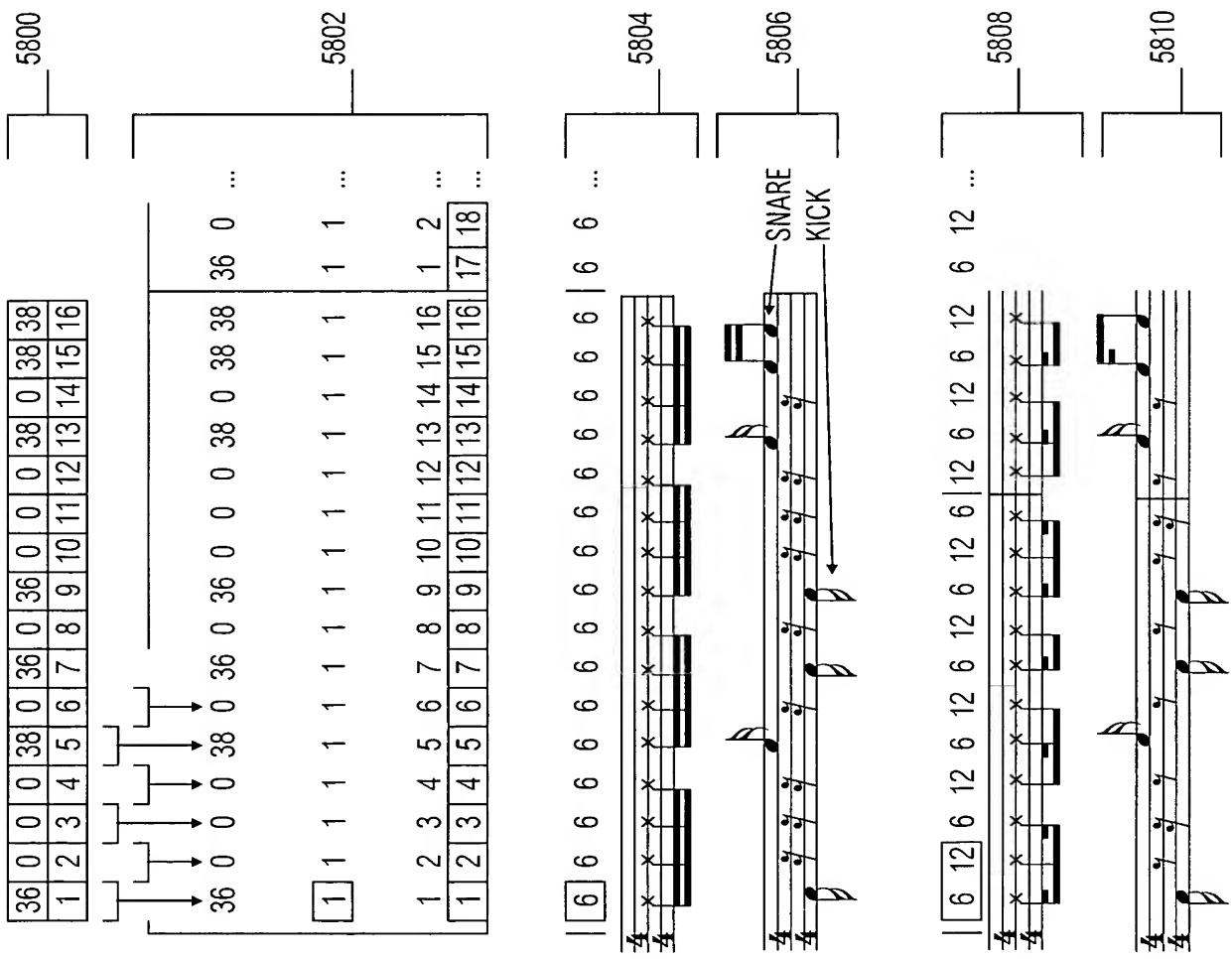

5800
DRUM PATTERN:
STEP:
36 0 0 0 38 0 36 0 36 0 0 0 38 0 38 38
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
RESULTING DRUM NOTES RETRIEVED FROM STEP AT INDEX:
36 0 0 0 38 0 36 0 36 0 0 0 38 0 38 38 36 0 ...
5802
CLUSTER PATTERN:
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 ...
NOTE SERIES INDEX AT BEGINNING OF CLUSTER:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 1 2 ...
RHYTHM EVENT:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ...
5804
RHYTHM PATTERN:
6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 ...
5806
RESULTING RHYTHM OF GENERATED DRUM NOTES:
SNARE
KICK
5808
RHYTHM PATTERN:
6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 6 12 ...
5810
RESULTING RHYTHM OF GENERATED DRUM NOTES:

FIG. 58

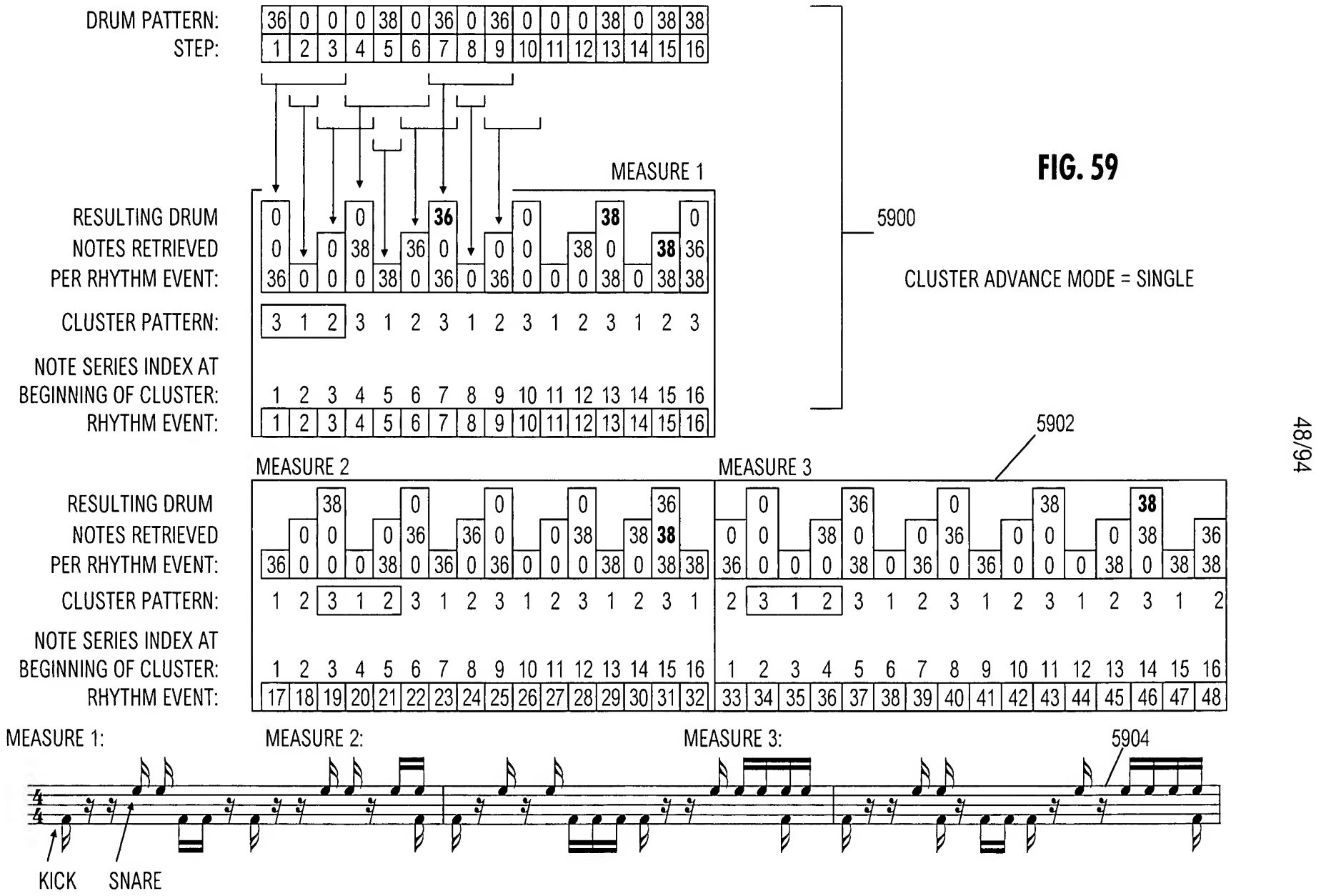

DRUM PATTERN:
STEP:
MEASURE 1
RESULTING DRUM NOTES RETRIEVED PER RHYTHM EVENT:
CLUSTER PATTERN:
NOTE SERIES INDEX AT BEGINNING OF CLUSTER:
RHYTHM EVENT:
5900
CLUSTER ADVANCE MODE = SINGLE
5902
MEASURE 2
MEASURE 3
MEASURE 1:
MEASURE 2:
MEASURE 3:
5904
KICK
SNARE

FIG. 59

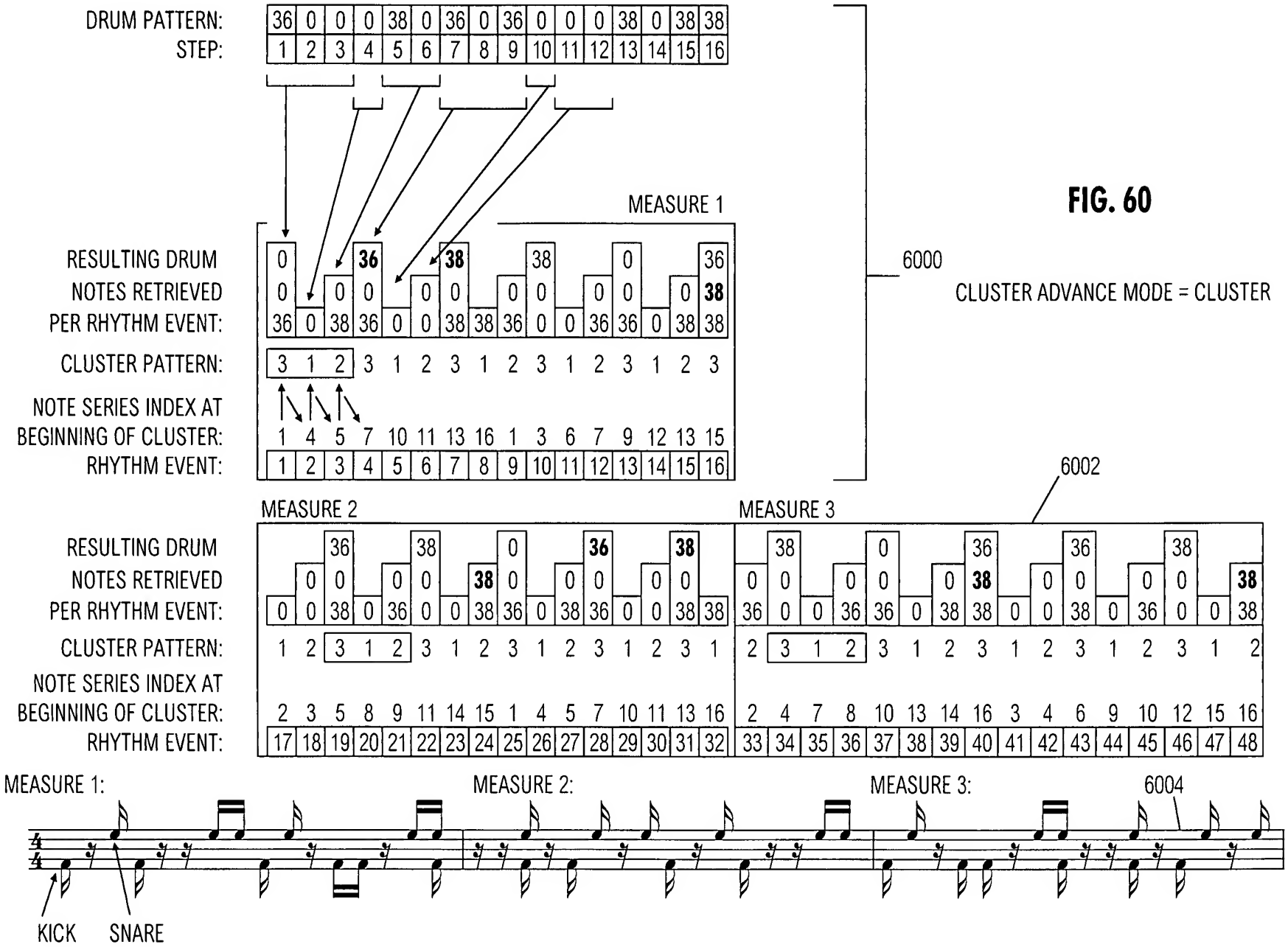

DRUM PATTERN:
STEP:
MEASURE 1
RESULTING DRUM
NOTES RETRIEVED
PER RHYTHM EVENT:
CLUSTER PATTERN:
NOTE SERIES INDEX AT
BEGINNING OF CLUSTER:
RHYTHM EVENT:
6000
CLUSTER ADVANCE MODE = CLUSTER
6002
MEASURE 2
MEASURE 3
MEASURE 1:
MEASURE 2:
MEASURE 3:
6004
KICK
SNARE

FIG. 60

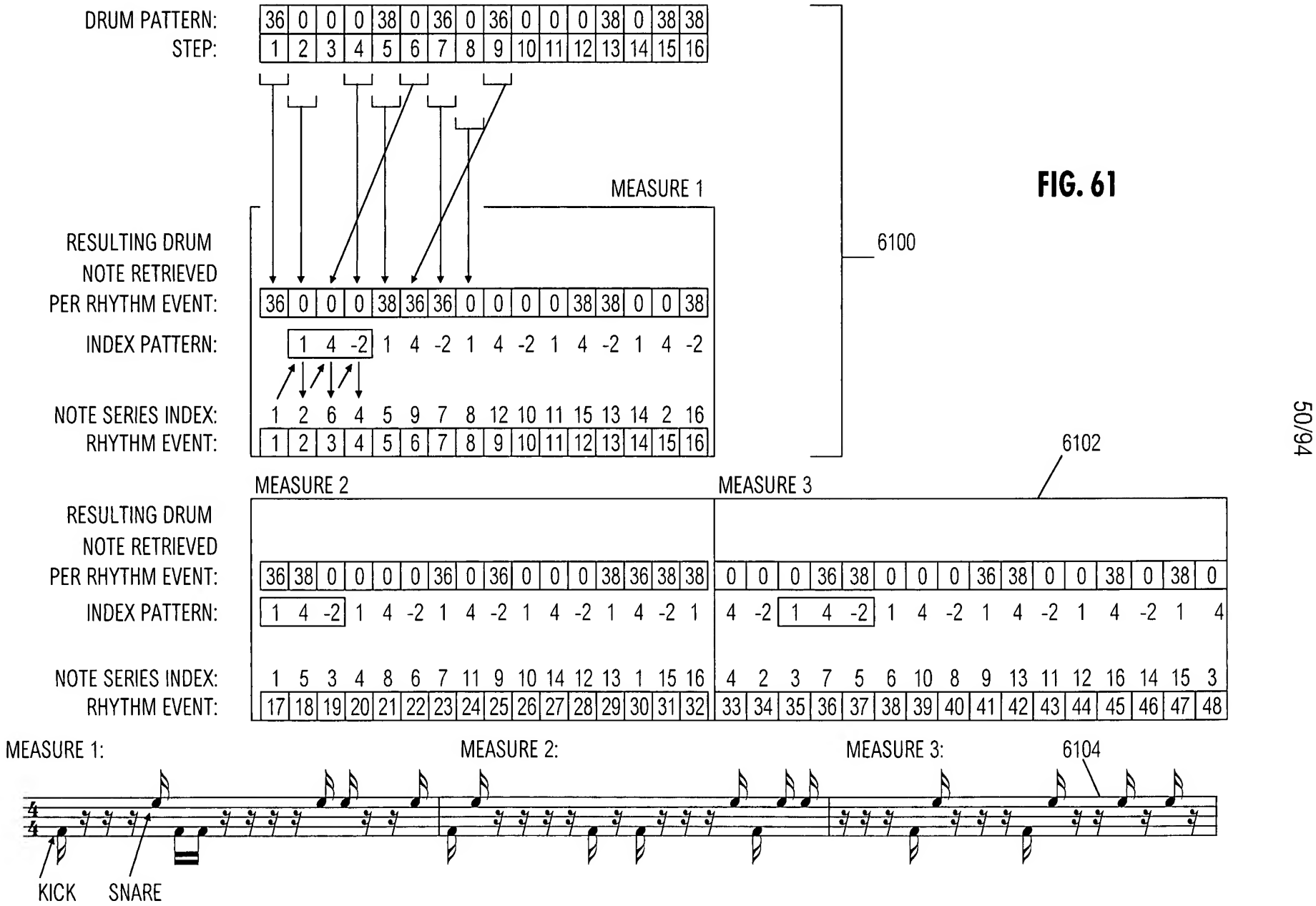

DRUM PATTERN:
36 0 0 0 38 0 36 0 36 0 0 0 38 0 38 38
STEP:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
MEASURE 1
6100
RESULTING DRUM NOTE RETRIEVED PER RHYTHM EVENT:
36 0 0 0 38 36 36 0 0 0 0 38 38 0 0 38
INDEX PATTERN:
1 4 -2 1 4 -2 1 4 -2 1 4 -2 1 4 -2
NOTE SERIES INDEX:
1 2 6 4 5 9 7 8 12 10 11 15 13 14 2 16
RHYTHM EVENT:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
6102
MEASURE 2
MEASURE 3
RESULTING DRUM NOTE RETRIEVED PER RHYTHM EVENT:
36 38 0 0 0 0 36 0 36 0 0 0 38 36 38 38
0 0 0 36 38 0 0 0 36 38 0 0 38 0 38 0
INDEX PATTERN:
1 4 -2 1 4 -2 1 4 -2 1 4 -2 1 4 -2 1
4 -2 1 4 -2 1 4 -2 1 4 -2 1 4 -2 1 4
NOTE SERIES INDEX:
1 5 3 4 8 6 7 11 9 10 14 12 13 1 15 16
4 2 3 7 5 6 10 8 9 13 11 12 16 14 15 3
RHYTHM EVENT:
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
MEASURE 1:
MEASURE 2:
MEASURE 3:
6104
KICK
SNARE

FIG. 61

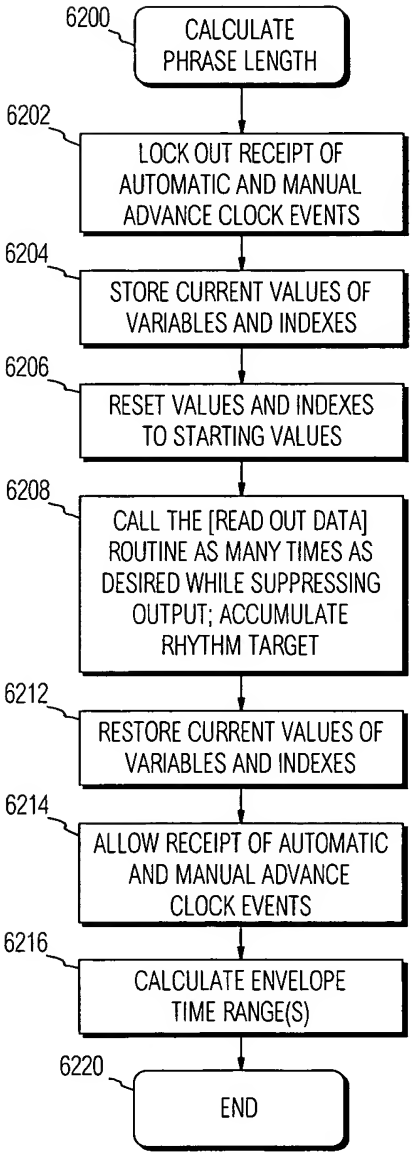

6200
CALCULATE PHRASE LENGTH
6202
LOCK OUT RECEIPT OF AUTOMATIC AND MANUAL ADVANCE CLOCK EVENTS
6204
STORE CURRENT VALUES OF VARIABLES AND INDEXES
6206
RESET VALUES AND INDEXES TO STARTING VALUES
6208
CALL THE [READ OUT DATA] ROUTINE AS MANY TIMES AS DESIRED WHILE SUPPRESSING OUTPUT; ACCUMULATE RHYTHM TARGET
6212
RESTORE CURRENT VALUES OF VARIABLES AND INDEXES
6214
ALLOW RECEIPT OF AUTOMATIC AND MANUAL ADVANCE CLOCK EVENTS
6216
CALCULATE ENVELOPE TIME RANGE(S)
6220
END

FIG. 62

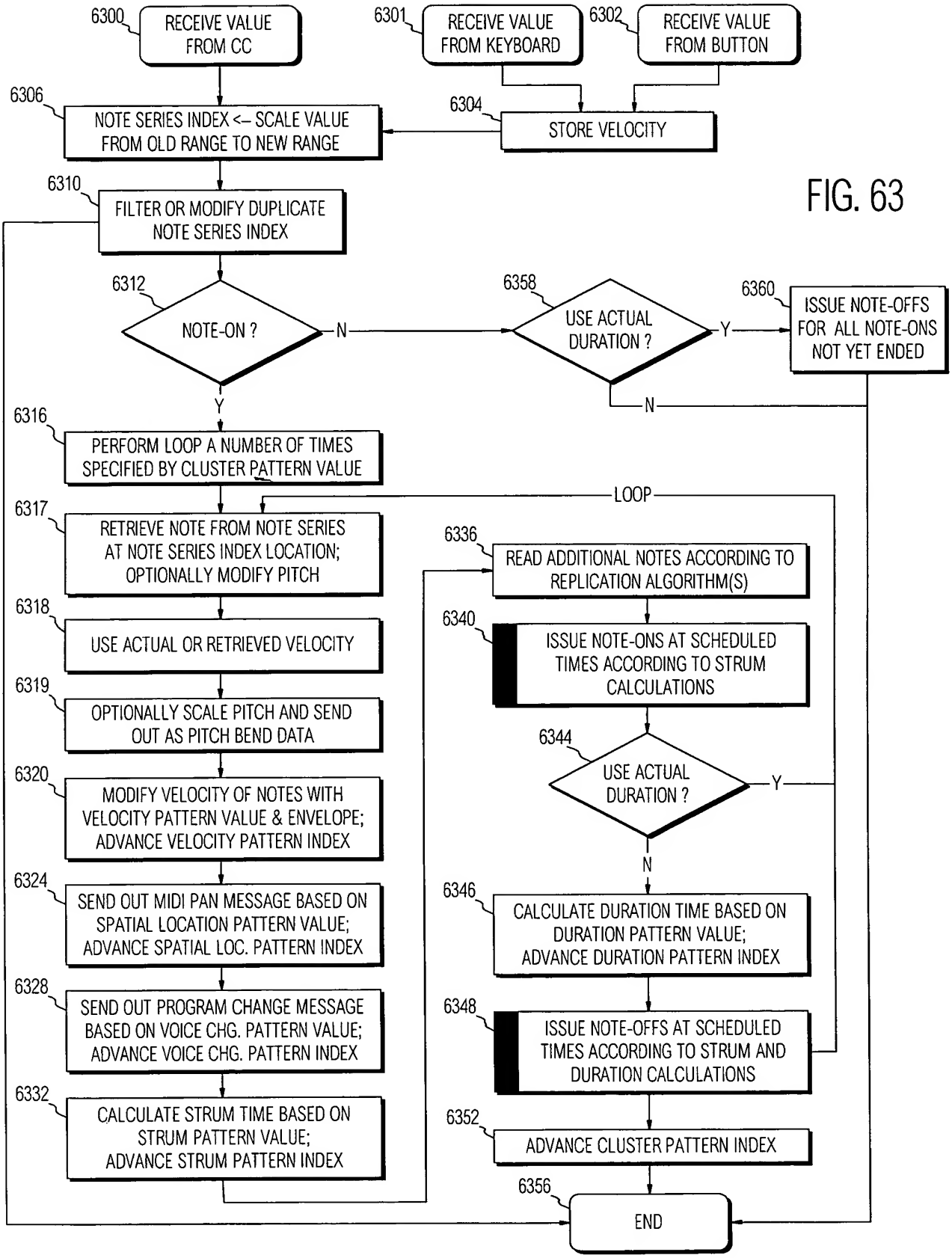

6300
RECEIVE VALUE FROM CC
6301
RECEIVE VALUE FROM KEYBOARD
6302
RECEIVE VALUE FROM BUTTON
6304
STORE VELOCITY
6306
NOTE SERIES INDEX <-- SCALE VALUE FROM OLD RANGE TO NEW RANGE
6310
FILTER OR MODIFY DUPLICATE NOTE SERIES INDEX
6312
NOTE-ON ?
N
Y
6358
USE ACTUAL DURATION ?
Y
N
6360
ISSUE NOTE-OFFS FOR ALL NOTE-ONS NOT YET ENDED
6316
PERFORM LOOP A NUMBER OF TIMES SPECIFIED BY CLUSTER PATTERN VALUE
LOOP
6317
RETRIEVE NOTE FROM NOTE SERIES AT NOTE SERIES INDEX LOCATION; OPTIONALLY MODIFY PITCH
6318
USE ACTUAL OR RETRIEVED VELOCITY
6319
OPTIONALLY SCALE PITCH AND SEND OUT AS PITCH BEND DATA
6320
MODIFY VELOCITY OF NOTES WITH VELOCITY PATTERN VALUE & ENVELOPE; ADVANCE VELOCITY PATTERN INDEX
6324
SEND OUT MIDI PAN MESSAGE BASED ON SPATIAL LOCATION PATTERN VALUE; ADVANCE SPATIAL LOC. PATTERN INDEX
6328
SEND OUT PROGRAM CHANGE MESSAGE BASED ON VOICE CHG. PATTERN VALUE; ADVANCE VOICE CHG. PATTERN INDEX
6332
CALCULATE STRUM TIME BASED ON STRUM PATTERN VALUE; ADVANCE STRUM PATTERN INDEX
6336
READ ADDITIONAL NOTES ACCORDING TO REPLICATION ALGORITHM(S)
6340
ISSUE NOTE-ONS AT SCHEDULED TIMES ACCORDING TO STRUM CALCULATIONS
6344
USE ACTUAL DURATION ?
Y
N
6346
CALCULATE DURATION TIME BASED ON DURATION PATTERN VALUE; ADVANCE DURATION PATTERN INDEX
6348
ISSUE NOTE-OFFS AT SCHEDULED TIMES ACCORDING TO STRUM AND DURATION CALCULATIONS
6352
ADVANCE CLUSTER PATTERN INDEX
6356
END

FIG. 63

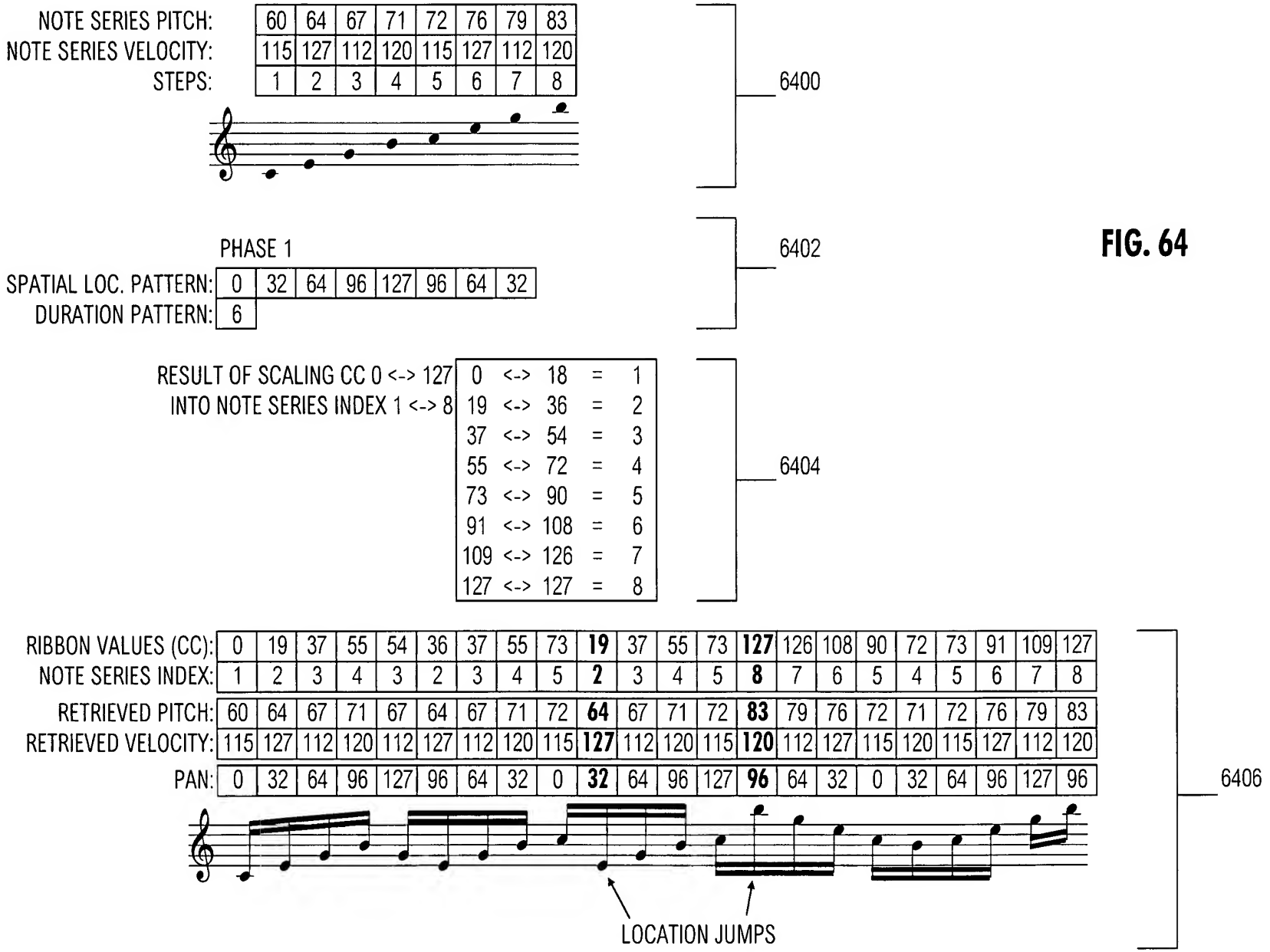

NOTE SERIES PITCH: 60 64 67 71 72 76 79 83
NOTE SERIES VELOCITY: 115 127 112 120 115 127 112 120
STEPS: 1 2 3 4 5 6 7 8
6400
PHASE 1
SPATIAL LOC. PATTERN: 0 32 64 96 127 96 64 32
DURATION PATTERN: 6
6402
RESULT OF SCALING CC 0 <-> 127 INTO NOTE SERIES INDEX 1 <-> 8
0 <-> 18 = 1
19 <-> 36 = 2
37 <-> 54 = 3
55 <-> 72 = 4
73 <-> 90 = 5
91 <-> 108 = 6
109 <-> 126 = 7
127 <-> 127 = 8
6404
RIBBON VALUES (CC): 0 19 37 55 54 36 37 55 73 19 37 55 73 127 126 108 90 72 73 91 109 127
NOTE SERIES INDEX: 1 2 3 4 3 2 3 4 5 2 3 4 5 8 7 6 5 4 5 6 7 8
RETRIEVED PITCH: 60 64 67 71 67 64 67 71 72 64 67 71 72 83 79 76 72 71 72 76 79 83
RETRIEVED VELOCITY: 115 127 112 120 112 127 112 120 115 127 112 120 115 120 112 127 115 120 115 127 112 120
PAN: 0 32 64 96 127 96 64 32 0 32 64 96 127 96 64 32 0 32 64 96 127 96
LOCATION JUMPS
6406

FIG. 64

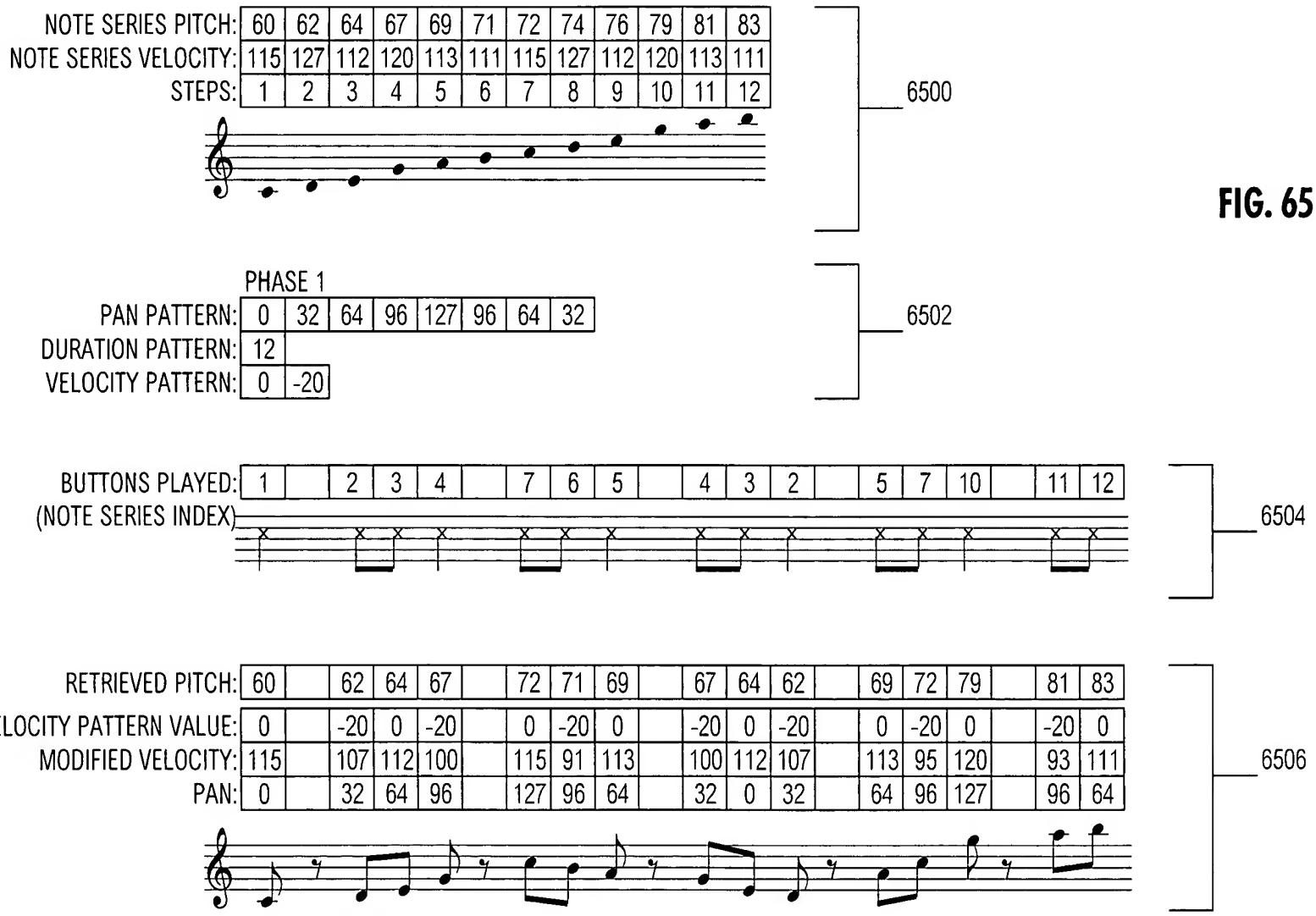
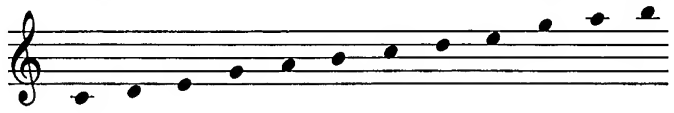

NOTE SERIES PITCH: 60 62 64 67 69 71 72 74 76 79 81 83
NOTE SERIES VELOCITY: 115 127 112 120 113 111 115 127 112 120 113 111
STEPS: 1 2 3 4 5 6 7 8 9 10 11 12
6500
PHASE 1
PAN PATTERN: 0 32 64 96 127 96 64 32
DURATION PATTERN: 12
VELOCITY PATTERN: 0 -20
6502
BUTTONS PLAYED: 1 2 3 4 7 6 5 4 3 2 5 7 10 11 12
(NOTE SERIES INDEX)
6504
RETRIEVED PITCH: 60 62 64 67 72 71 69 67 64 62 69 72 79 81 83
VELOCITY PATTERN VALUE: 0 -20 0 -20 0 -20 0 -20 0 -20 0 -20 0 -20 0
MODIFIED VELOCITY: 115 107 112 100 115 91 113 100 112 107 113 95 120 93 111
PAN: 0 32 64 96 127 96 64 32 0 32 64 96 127 96 64
6506

FIG. 65

NOTE SERIES PITCH:	60	62	64	67	69	71	72	74	76	79	81	83
NOTE SERIES VELOCITY:	115	127	112	120	113	111	115	127	112	120	113	111
STEPS:	1	2	3	4	5	6	7	8	9	10	11	12



6600

PHASE 1

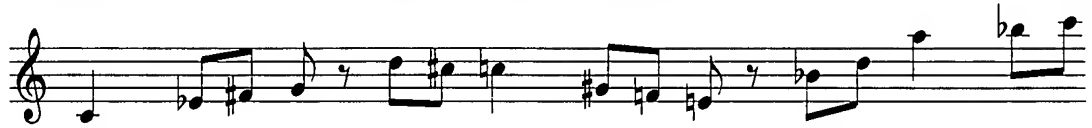
SPATIAL LOC. PATTERN:	0	32	64	96	127	96	64	32

6602

RESULT OF SCALING	60	<->	62	=	1		74	<->	75	=	7
PITCH RANGE 60 <-> 84 INTO	63	<->	64	=	2		76	<->	77	=	8
NOTE SERIES INDEX 1 <-> 12	65	<->	66	=	3		78	<->	79	=	9
	67	<->	68	=	4		80	<->	81	=	10
	69	<->	70	=	5		82	<->	83	=	11
	71	<->	73	=	6		84	<->	84	=	12

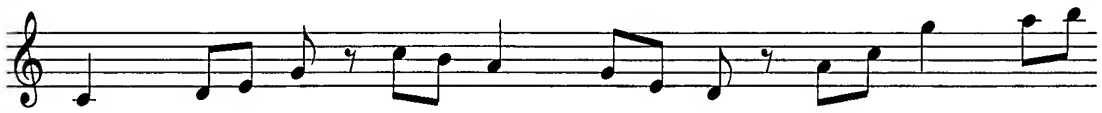
6604

PITCHES PLAYED:	60		63	66	67		74	73	72		68	65	64		70	74	81		83	84
VELOCITIES PLAYED:	116		120	127	113		111	115	107		95	99	106		125	85	93		94	100



6606

NOTE SERIES INDEX:	0		1	2	3		6	5	**4**		3	2	1		4	6	9		10	11
RETRIEVED PITCH:	60		62	64	67		72	71	69		67	64	62		69	72	79		81	83
ACTUAL VELOCITY:	116		120	127	113		111	115	107		95	99	106		125	85	93		94	100
PAN:	0		32	64	96		127	96	64		32	0	32		64	96	127		96	64



6608

FIG. 66

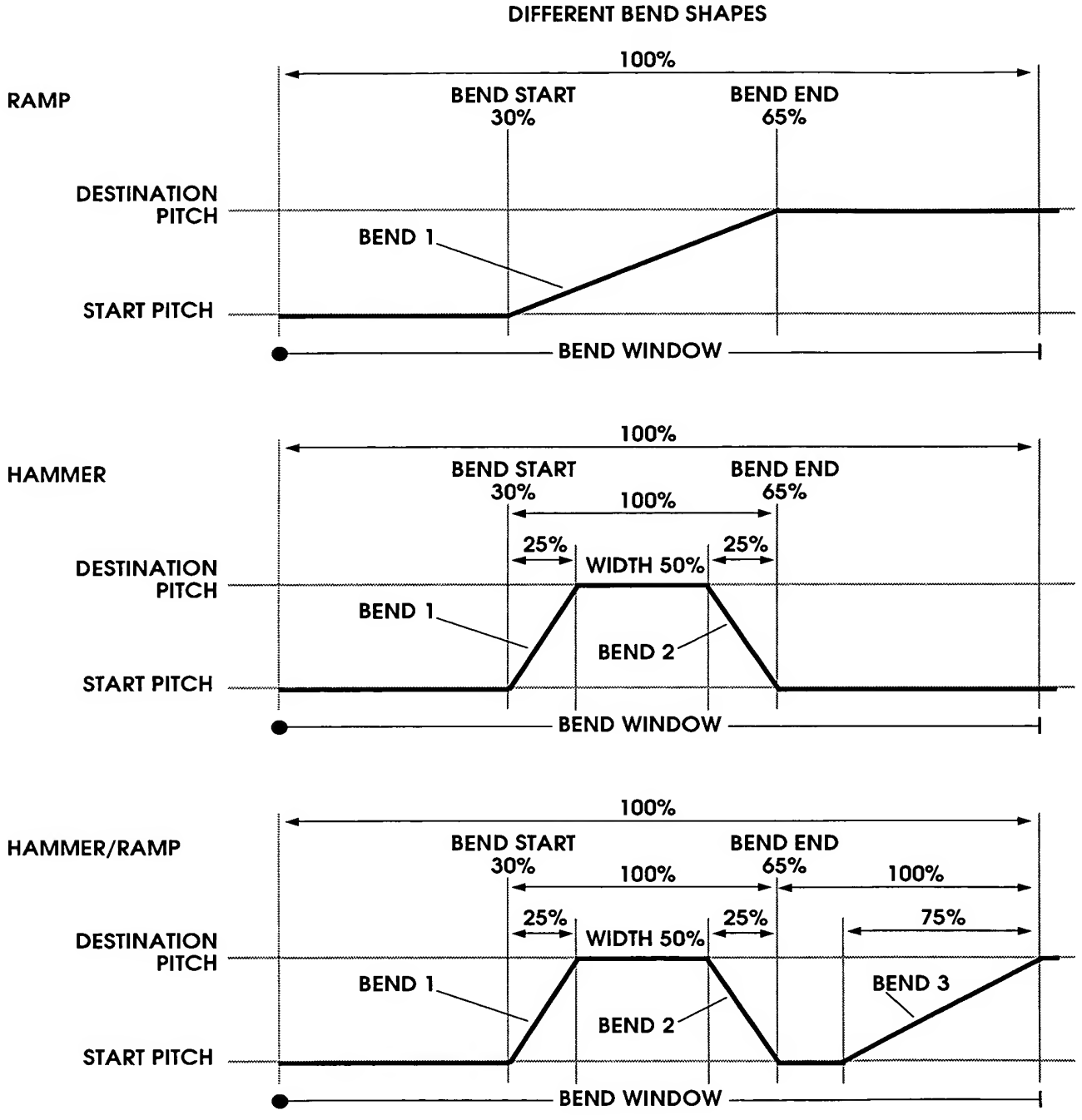

DIFFERENT BEND SHAPES
RAMP
100%
BEND START
30%
BEND END
65%
DESTINATION
PITCH
BEND 1
START PITCH
BEND WINDOW
HAMMER
100%
BEND START
30%
BEND END
65%
100%
25%
WIDTH 50%
25%
DESTINATION
PITCH
BEND 1
BEND 2
START PITCH
BEND WINDOW
HAMMER/RAMP
100%
BEND START
30%
BEND END
65%
100%
100%
25%
WIDTH 50%
25%
75%
DESTINATION
PITCH
BEND 1
BEND 3
BEND 2
START PITCH
BEND WINDOW

FIG. 67

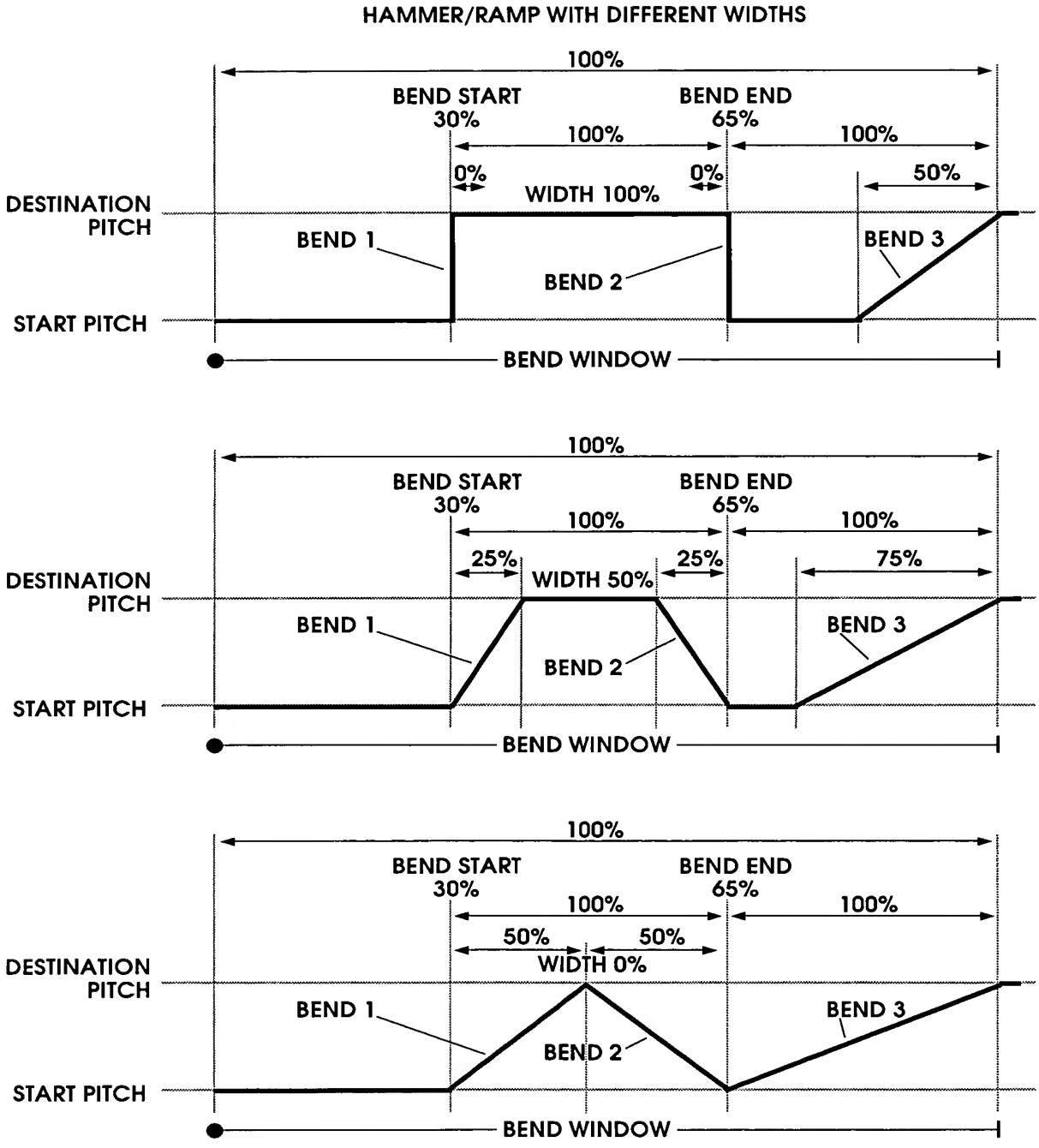

HAMMER/RAMP WITH DIFFERENT WIDTHS
100%
BEND START
30%
BEND END
65%
100%
100%
0%
0%
50%
WIDTH 100%
DESTINATION
PITCH
BEND 1
BEND 2
BEND 3
START PITCH
BEND WINDOW
100%
BEND START
30%
BEND END
65%
100%
100%
25%
25%
75%
WIDTH 50%
DESTINATION
PITCH
BEND 1
BEND 2
BEND 3
START PITCH
BEND WINDOW
100%
BEND START
30%
BEND END
65%
100%
100%
50%
50%
WIDTH 0%
DESTINATION
PITCH
BEND 1
BEND 2
BEND 3
START PITCH
BEND WINDOW

FIG. 68

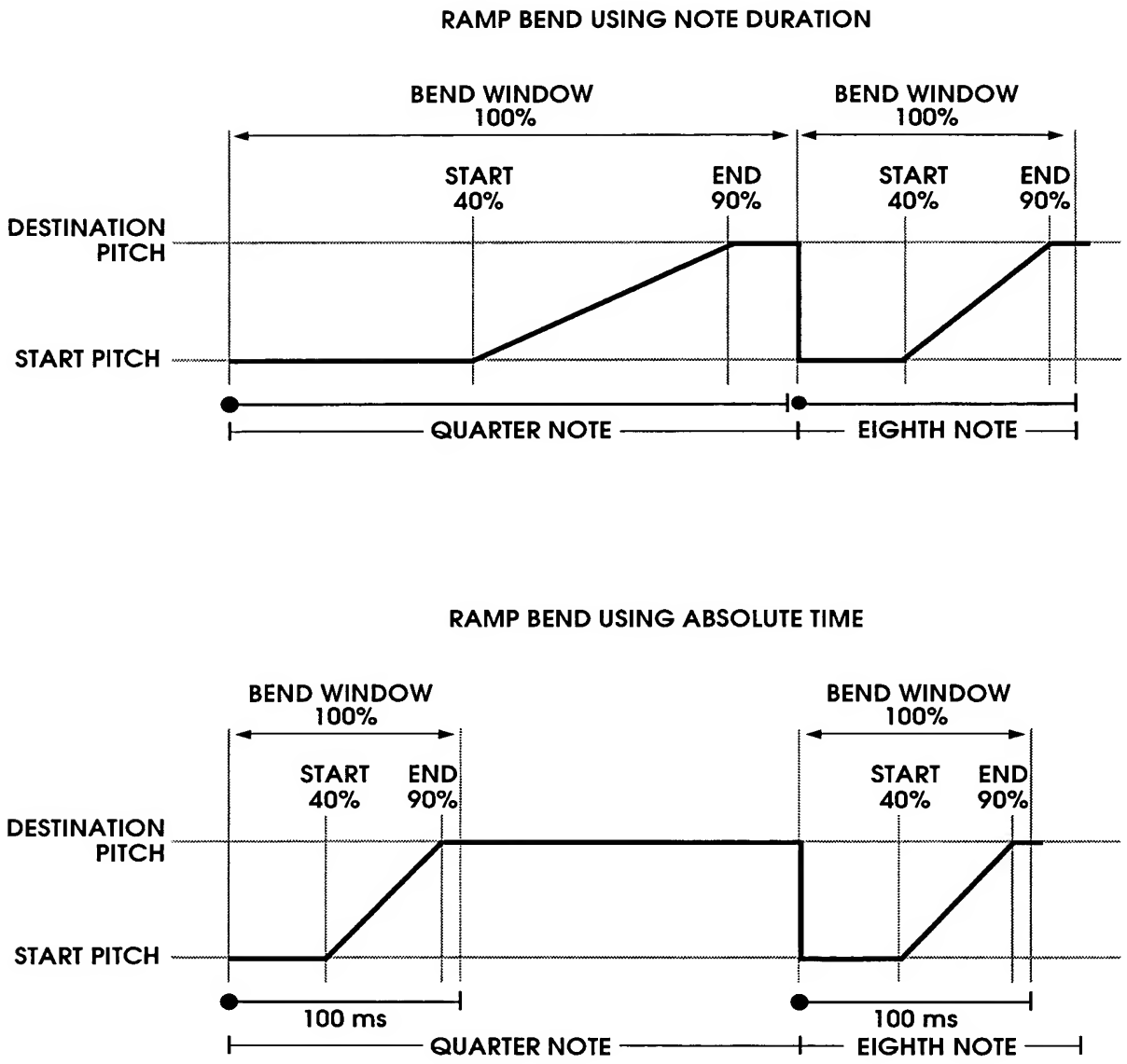

RAMP BEND USING NOTE DURATION
BEND WINDOW
100%
BEND WINDOW
100%
START
40%
END
90%
START
40%
END
90%
DESTINATION
PITCH
START PITCH
QUARTER NOTE
EIGHTH NOTE
RAMP BEND USING ABSOLUTE TIME
BEND WINDOW
100%
BEND WINDOW
100%
START
40%
END
90%
START
40%
END
90%
DESTINATION
PITCH
START PITCH
100 ms
100 ms
QUARTER NOTE
EIGHTH NOTE

FIG. 69

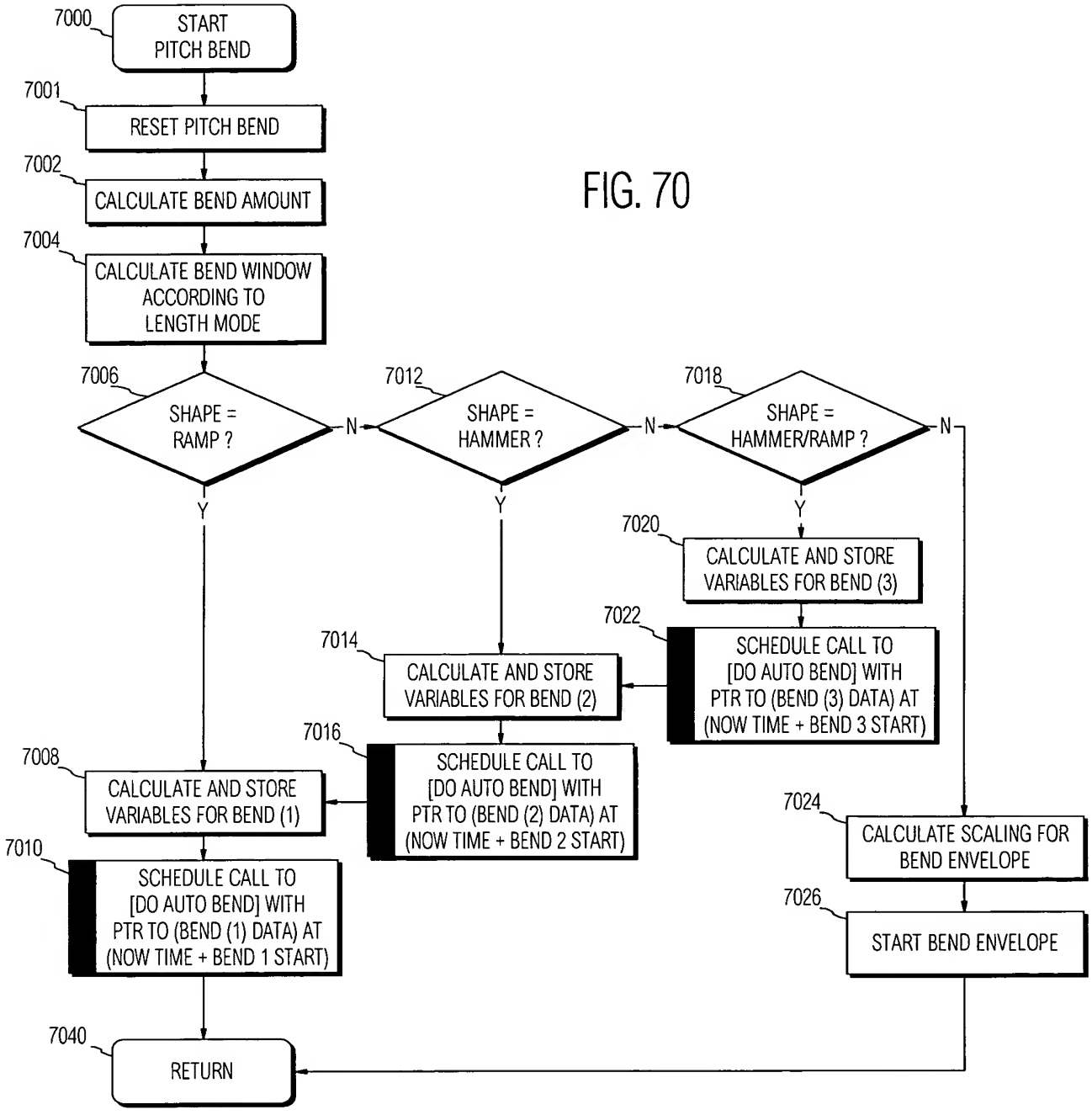

7000
START PITCH BEND
7001
RESET PITCH BEND
7002
CALCULATE BEND AMOUNT
7004
CALCULATE BEND WINDOW ACCORDING TO LENGTH MODE
7006
SHAPE = RAMP ?
N
Y
7012
SHAPE = HAMMER ?
N
Y
7018
SHAPE = HAMMER/RAMP ?
N
Y
7020
CALCULATE AND STORE VARIABLES FOR BEND (3)
7022
SCHEDULE CALL TO [DO AUTO BEND] WITH PTR TO (BEND (3) DATA) AT (NOW TIME + BEND 3 START)
7014
CALCULATE AND STORE VARIABLES FOR BEND (2)
7016
SCHEDULE CALL TO [DO AUTO BEND] WITH PTR TO (BEND (2) DATA) AT (NOW TIME + BEND 2 START)
7008
CALCULATE AND STORE VARIABLES FOR BEND (1)
7010
SCHEDULE CALL TO [DO AUTO BEND] WITH PTR TO (BEND (1) DATA) AT (NOW TIME + BEND 1 START)
7024
CALCULATE SCALING FOR BEND ENVELOPE
7026
START BEND ENVELOPE
7040
RETURN

FIG. 70

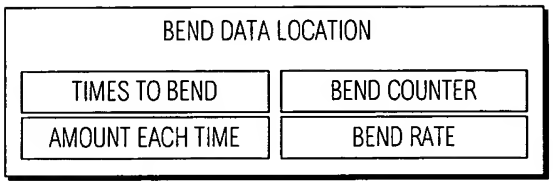


FIG. 71

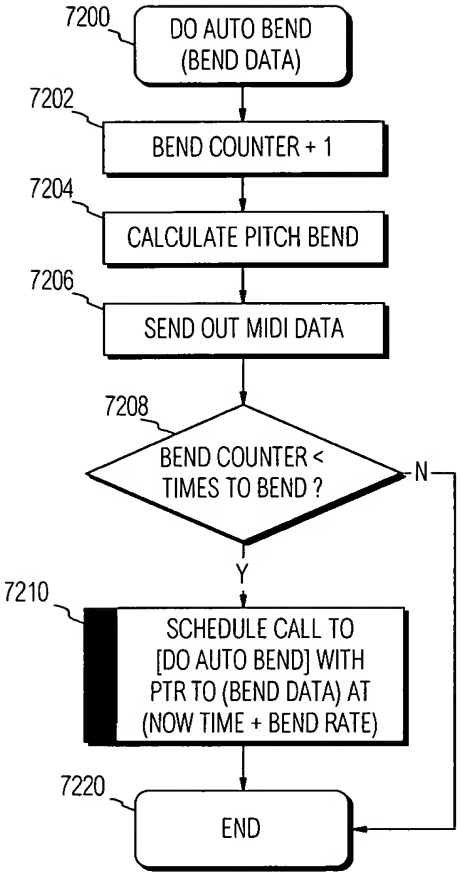


FIG. 72

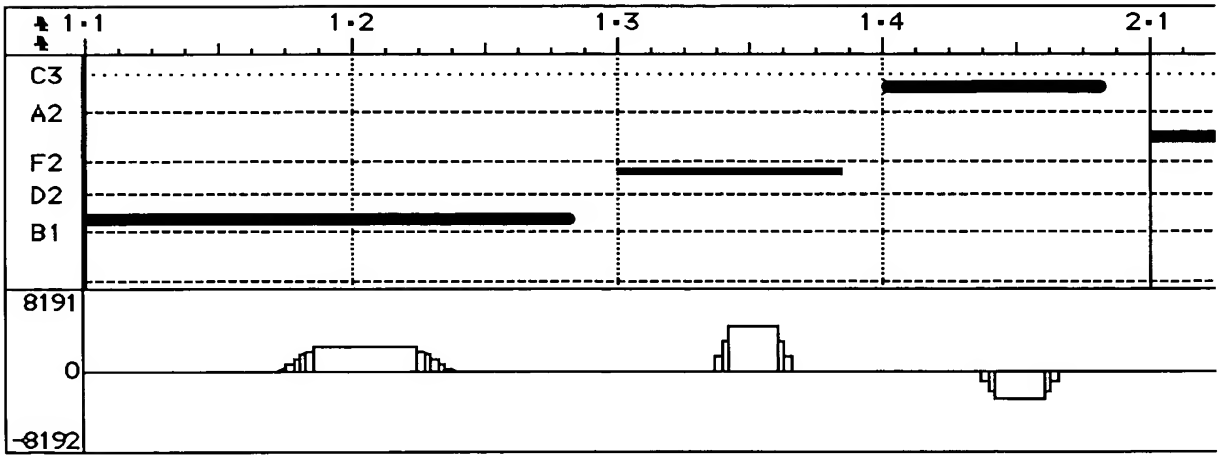
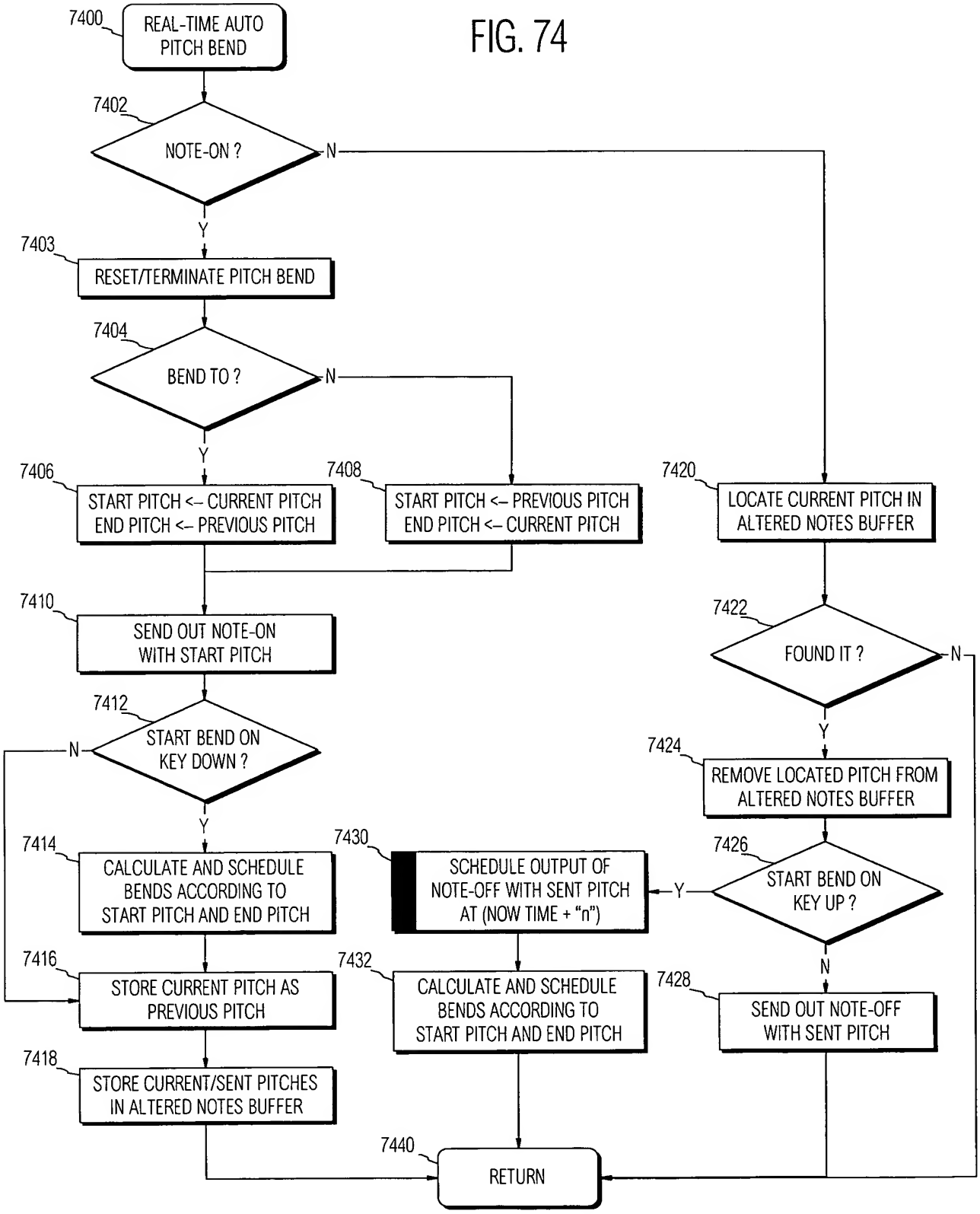


FIG. 73

FIG. 74


7400
REAL-TIME AUTO PITCH BEND
7402
NOTE-ON ?
N
Y
7403
RESET/TERMINATE PITCH BEND
7404
BEND TO ?
N
Y
7406
START PITCH <-- CURRENT PITCH
END PITCH <-- PREVIOUS PITCH
7408
START PITCH <-- PREVIOUS PITCH
END PITCH <-- CURRENT PITCH
7410
SEND OUT NOTE-ON WITH START PITCH
7412
START BEND ON KEY DOWN ?
N
Y
7414
CALCULATE AND SCHEDULE BENDS ACCORDING TO START PITCH AND END PITCH
7416
STORE CURRENT PITCH AS PREVIOUS PITCH
7418
STORE CURRENT/SENT PITCHES IN ALTERED NOTES BUFFER
7420
LOCATE CURRENT PITCH IN ALTERED NOTES BUFFER
7422
FOUND IT ?
N
Y
7424
REMOVE LOCATED PITCH FROM ALTERED NOTES BUFFER
7426
START BEND ON KEY UP ?
Y
N
7428
SEND OUT NOTE-OFF WITH SENT PITCH
7430
SCHEDULE OUTPUT OF NOTE-OFF WITH SENT PITCH AT (NOW TIME + "n")
7432
CALCULATE AND SCHEDULE BENDS ACCORDING TO START PITCH AND END PITCH
7440
RETURN

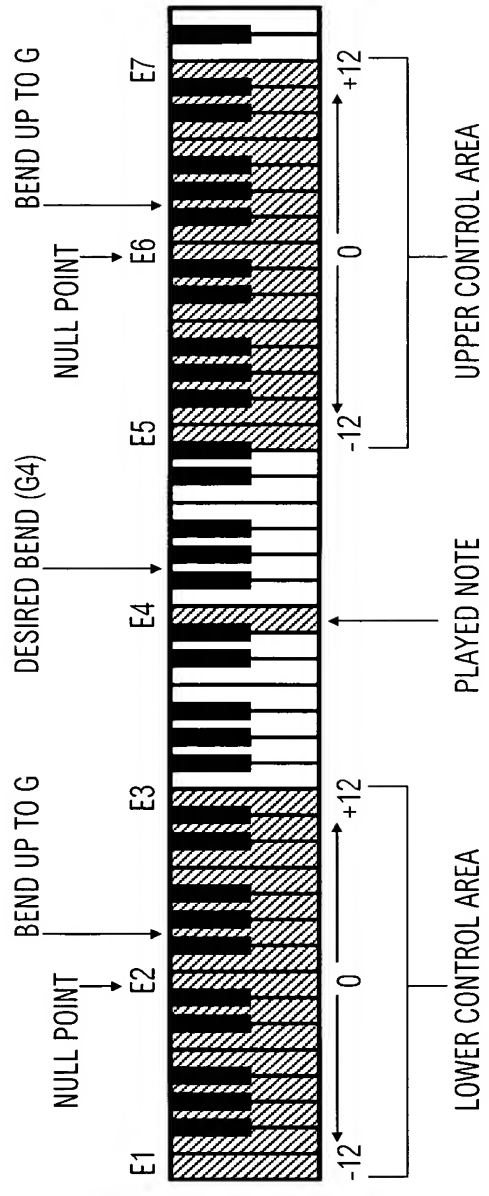
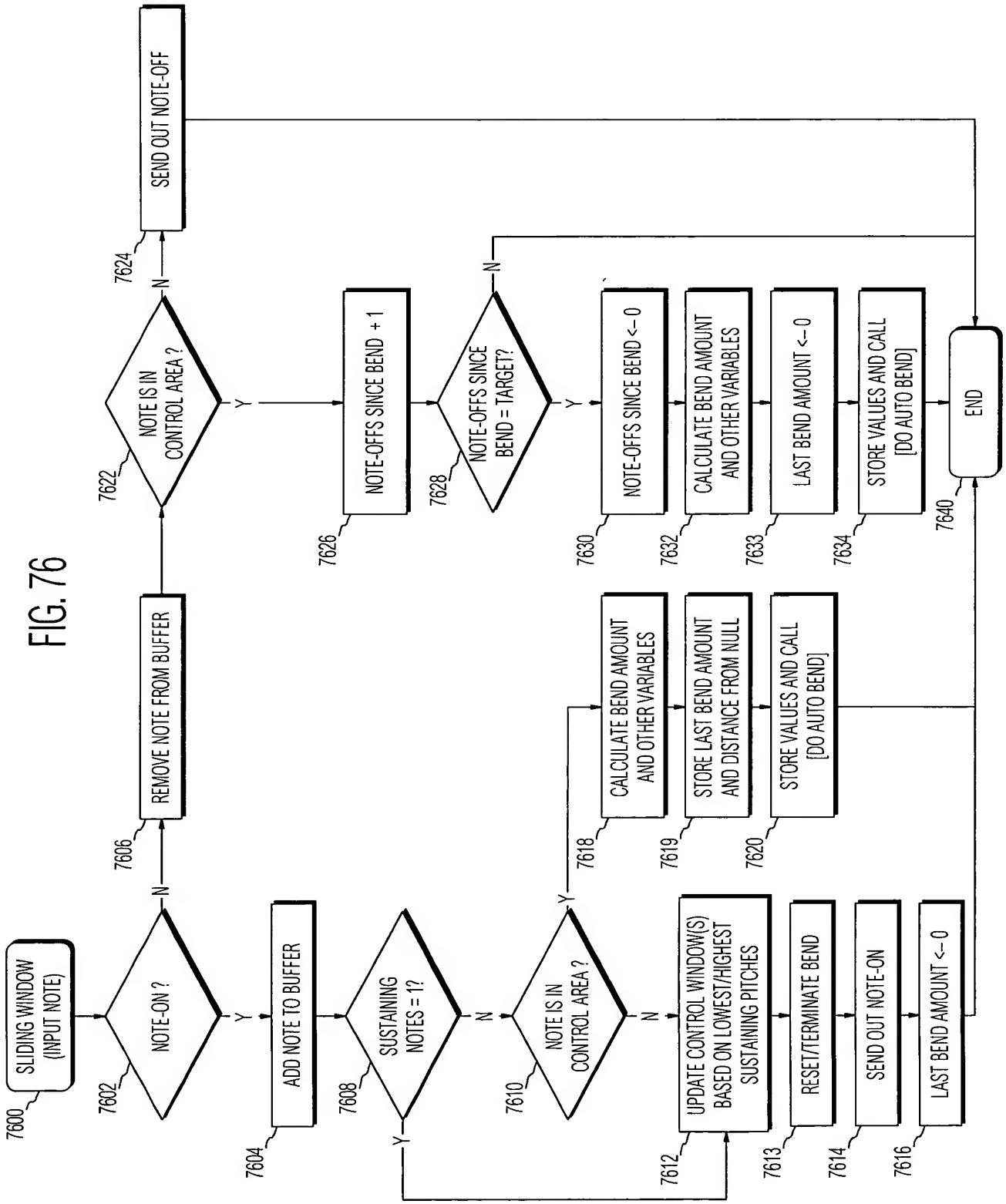

BEND UP TO G
NULL POINT
DESIRED BEND (G4)
BEND UP TO G
NULL POINT
E1
E2
E3
E4
E5
E6
E7
+12
0
-12
+12
0
-12
LOWER CONTROL AREA
PLAYED NOTE
UPPER CONTROL AREA

FIG. 75

FIG. 76


7600
SLIDING WINDOW (INPUT NOTE)
7602
NOTE-ON ?
Y
N
7604
ADD NOTE TO BUFFER
7606
REMOVE NOTE FROM BUFFER
7608
SUSTAINING NOTES = 1?
Y
N
7610
NOTE IS IN CONTROL AREA ?
Y
N
7612
UPDATE CONTROL WINDOW(S) BASED ON LOWEST/HIGHEST SUSTAINING PITCHES
7613
RESET/TERMINATE BEND
7614
SEND OUT NOTE-ON
7616
LAST BEND AMOUNT <- 0
7618
CALCULATE BEND AMOUNT AND OTHER VARIABLES
7619
STORE LAST BEND AMOUNT AND DISTANCE FROM NULL
7620
STORE VALUES AND CALL [DO AUTO BEND]
7622
NOTE IS IN CONTROL AREA ?
Y
N
7624
SEND OUT NOTE-OFF
7626
NOTE-OFFS SINCE BEND + 1
7628
NOTE-OFFS SINCE BEND = TARGET?
Y
N
7630
NOTE-OFFS SINCE BEND <- 0
7632
CALCULATE BEND AMOUNT AND OTHER VARIABLES
7633
LAST BEND AMOUNT <- 0
7634
STORE VALUES AND CALL [DO AUTO BEND]
7640
END

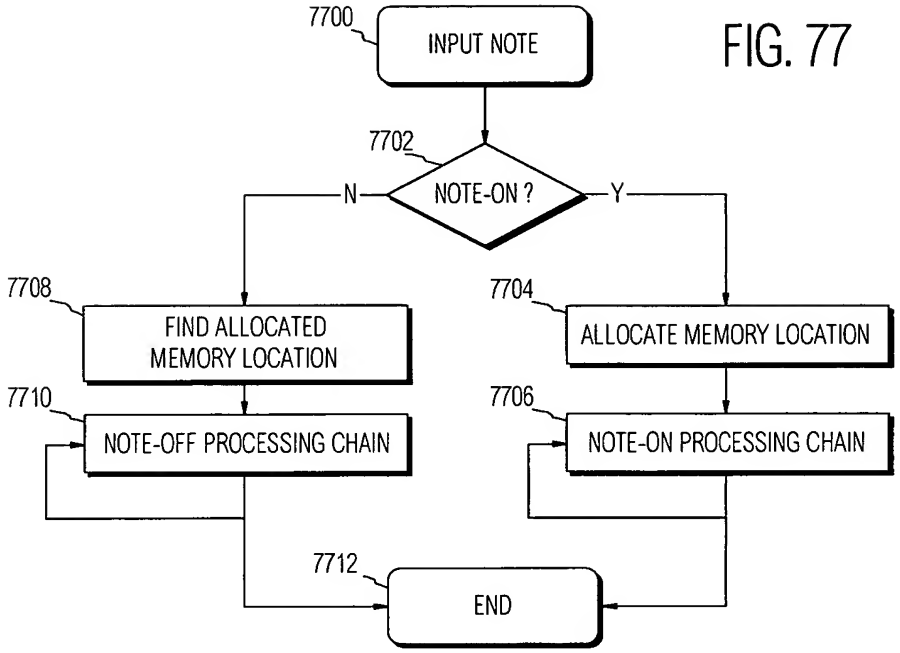

7700
INPUT NOTE
7702
NOTE-ON ?
N
Y
7708
FIND ALLOCATED MEMORY LOCATION
7704
ALLOCATE MEMORY LOCATION
7710
NOTE-OFF PROCESSING CHAIN
7706
NOTE-ON PROCESSING CHAIN
7712
END

FIG. 77

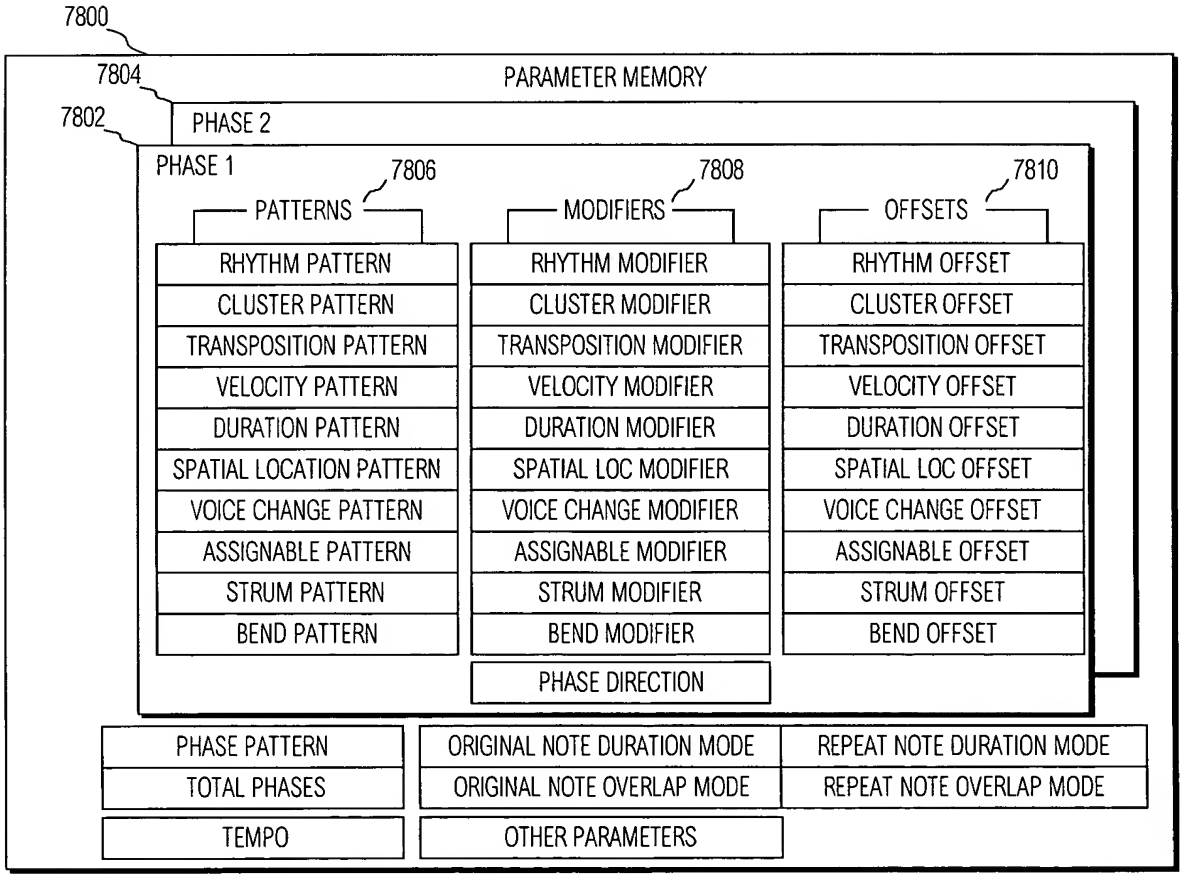

7800
7804
PARAMETER MEMORY
7802
PHASE 2
PHASE 1
7806
PATTERNS
7808
MODIFIERS
7810
OFFSETS
RHYTHM PATTERN
CLUSTER PATTERN
TRANSPOSITION PATTERN
VELOCITY PATTERN
DURATION PATTERN
SPATIAL LOCATION PATTERN
VOICE CHANGE PATTERN
ASSIGNABLE PATTERN
STRUM PATTERN
BEND PATTERN
RHYTHM MODIFIER
CLUSTER MODIFIER
TRANSPOSITION MODIFIER
VELOCITY MODIFIER
DURATION MODIFIER
SPATIAL LOC MODIFIER
VOICE CHANGE MODIFIER
ASSIGNABLE MODIFIER
STRUM MODIFIER
BEND MODIFIER
PHASE DIRECTION
RHYTHM OFFSET
CLUSTER OFFSET
TRANSPOSITION OFFSET
VELOCITY OFFSET
DURATION OFFSET
SPATIAL LOC OFFSET
VOICE CHANGE OFFSET
ASSIGNABLE OFFSET
STRUM OFFSET
BEND OFFSET
PHASE PATTERN
TOTAL PHASES
TEMPO
ORIGINAL NOTE DURATION MODE
ORIGINAL NOTE OVERLAP MODE
OTHER PARAMETERS
REPEAT NOTE DURATION MODE
REPEAT NOTE OVERLAP MODE

FIG. 78

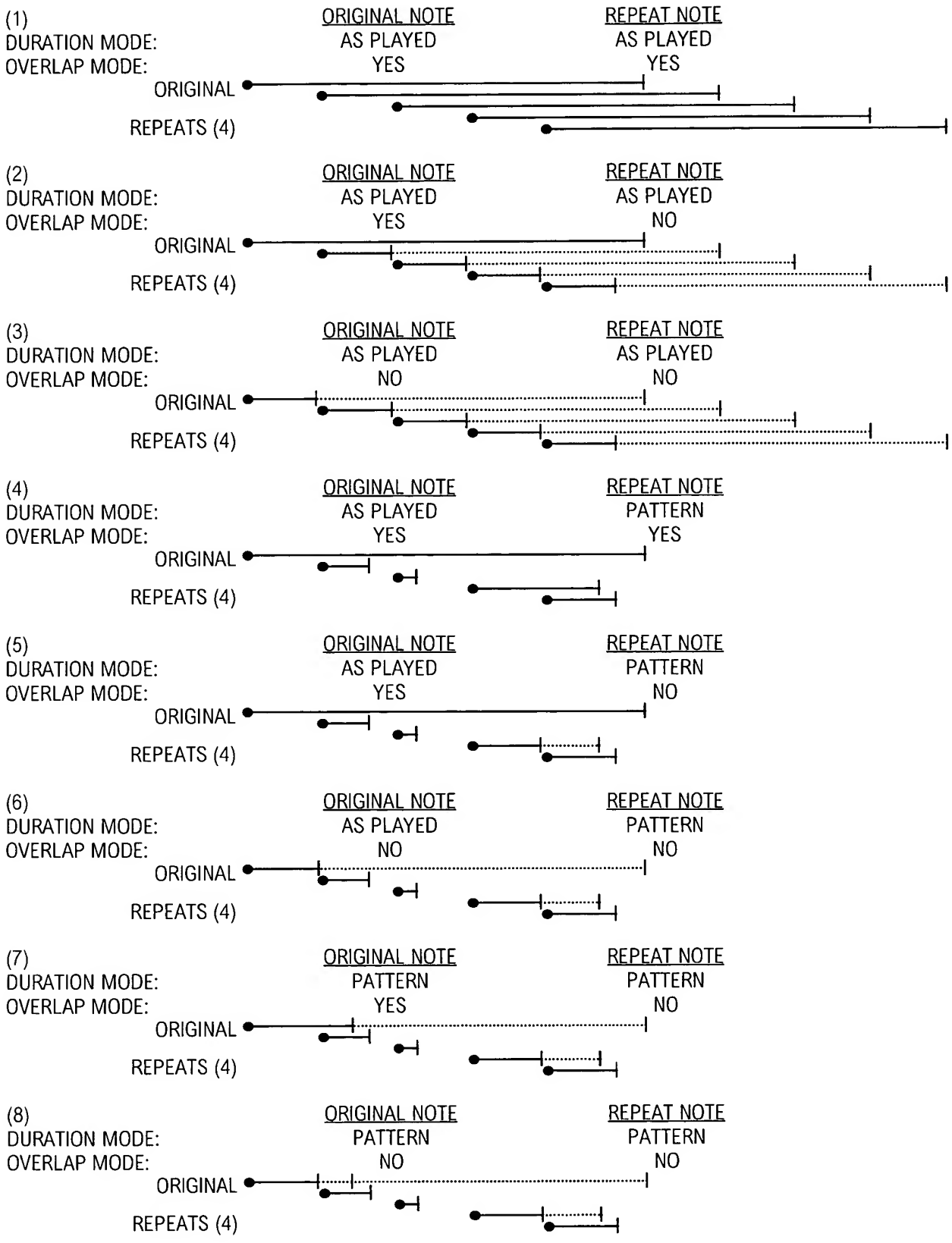

(1)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
YES
REPEAT NOTE
AS PLAYED
YES
ORIGINAL
REPEATS (4)
(2)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
YES
REPEAT NOTE
AS PLAYED
NO
ORIGINAL
REPEATS (4)
(3)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
NO
REPEAT NOTE
AS PLAYED
NO
ORIGINAL
REPEATS (4)
(4)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
YES
REPEAT NOTE
PATTERN
YES
ORIGINAL
REPEATS (4)
(5)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
YES
REPEAT NOTE
PATTERN
NO
ORIGINAL
REPEATS (4)
(6)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
AS PLAYED
NO
REPEAT NOTE
PATTERN
NO
ORIGINAL
REPEATS (4)
(7)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
PATTERN
YES
REPEAT NOTE
PATTERN
NO
ORIGINAL
REPEATS (4)
(8)
DURATION MODE:
OVERLAP MODE:
ORIGINAL NOTE
PATTERN
NO
REPEAT NOTE
PATTERN
NO
ORIGINAL
REPEATS (4)

FIG. 79

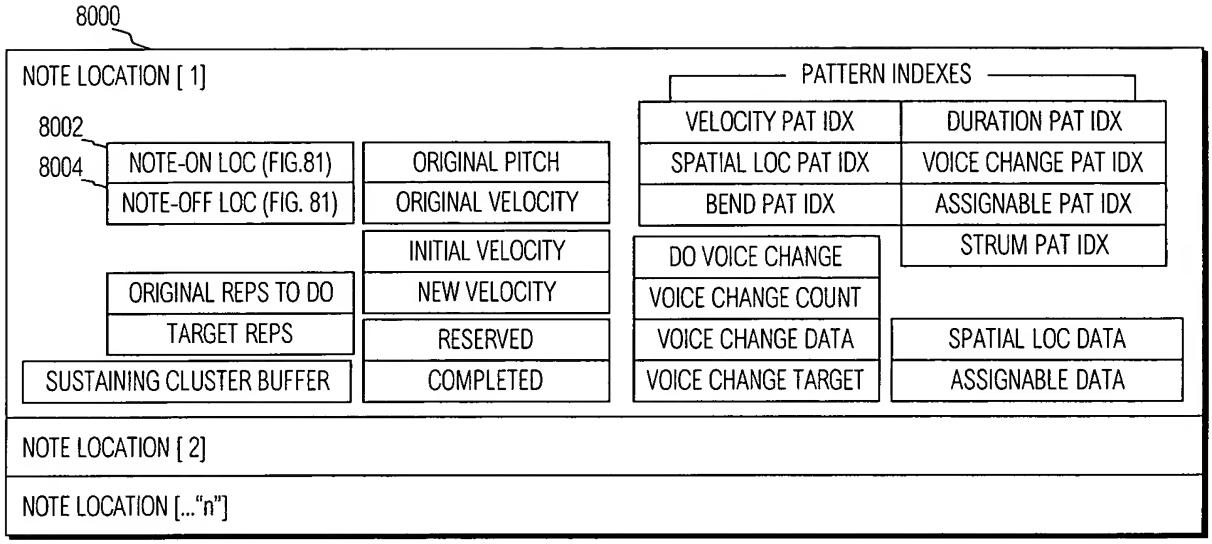

8000
NOTE LOCATION [1]
PATTERN INDEXES
8002
8004
NOTE-ON LOC (FIG.81)
NOTE-OFF LOC (FIG. 81)
ORIGINAL PITCH
ORIGINAL VELOCITY
INITIAL VELOCITY
NEW VELOCITY
RESERVED
COMPLETED
ORIGINAL REPS TO DO
TARGET REPS
SUSTAINING CLUSTER BUFFER
VELOCITY PAT IDX
DURATION PAT IDX
SPATIAL LOC PAT IDX
VOICE CHANGE PAT IDX
BEND PAT IDX
ASSIGNABLE PAT IDX
STRUM PAT IDX
DO VOICE CHANGE
VOICE CHANGE COUNT
VOICE CHANGE DATA
VOICE CHANGE TARGET
SPATIAL LOC DATA
ASSIGNABLE DATA
NOTE LOCATION [2]
NOTE LOCATION [..."n"]

FIG. 80

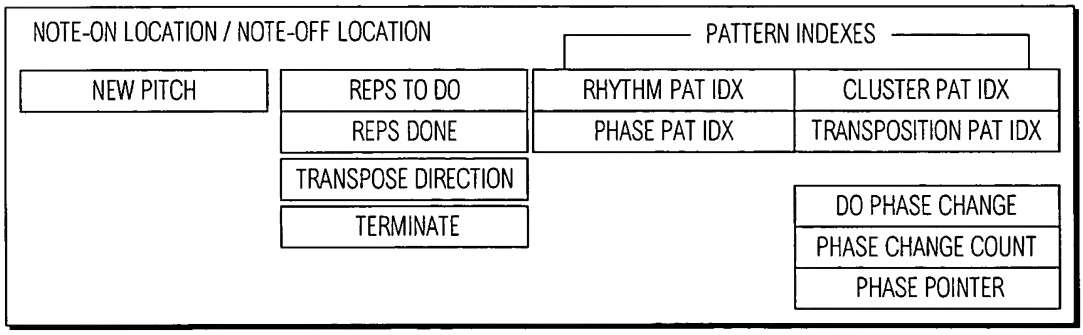

NOTE-ON LOCATION / NOTE-OFF LOCATION
PATTERN INDEXES
NEW PITCH
REPS TO DO
REPS DONE
TRANSPOSE DIRECTION
TERMINATE
RHYTHM PAT IDX
PHASE PAT IDX
CLUSTER PAT IDX
TRANSPOSITION PAT IDX
DO PHASE CHANGE
PHASE CHANGE COUNT
PHASE POINTER

FIG. 81

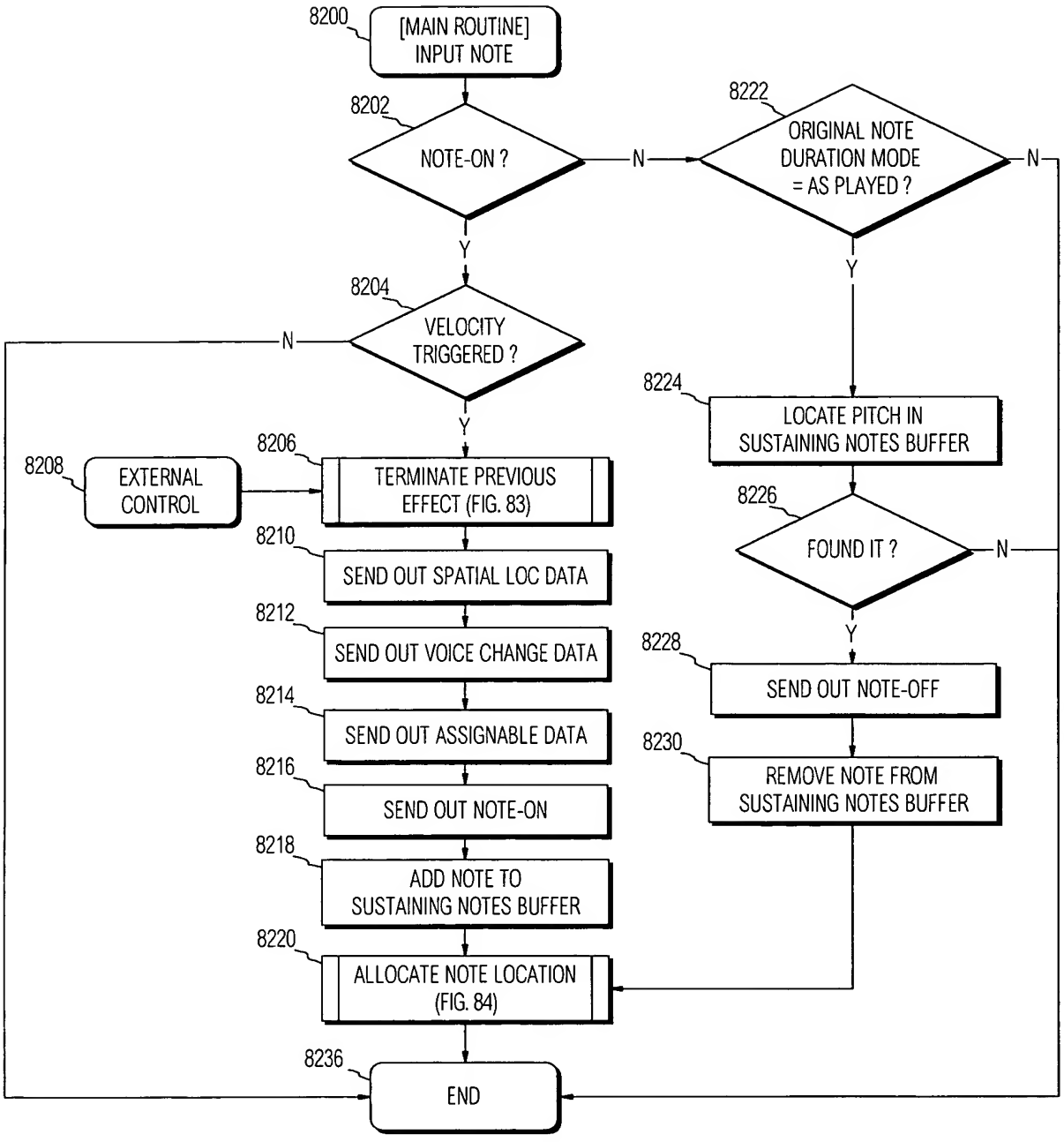

8200
[MAIN ROUTINE]
INPUT NOTE
8202
NOTE-ON ?
N
8222
ORIGINAL NOTE
DURATION MODE
= AS PLAYED ?
N
Y
Y
8204
VELOCITY
TRIGGERED ?
N
Y
8224
LOCATE PITCH IN
SUSTAINING NOTES BUFFER
8206
8208
EXTERNAL
CONTROL
TERMINATE PREVIOUS
EFFECT (FIG. 83)
8226
FOUND IT ?
N
8210
SEND OUT SPATIAL LOC DATA
Y
8212
SEND OUT VOICE CHANGE DATA
8228
SEND OUT NOTE-OFF
8214
SEND OUT ASSIGNABLE DATA
8230
REMOVE NOTE FROM
SUSTAINING NOTES BUFFER
8216
SEND OUT NOTE-ON
8218
ADD NOTE TO
SUSTAINING NOTES BUFFER
8220
ALLOCATE NOTE LOCATION
(FIG. 84)
8236
END

FIG. 82

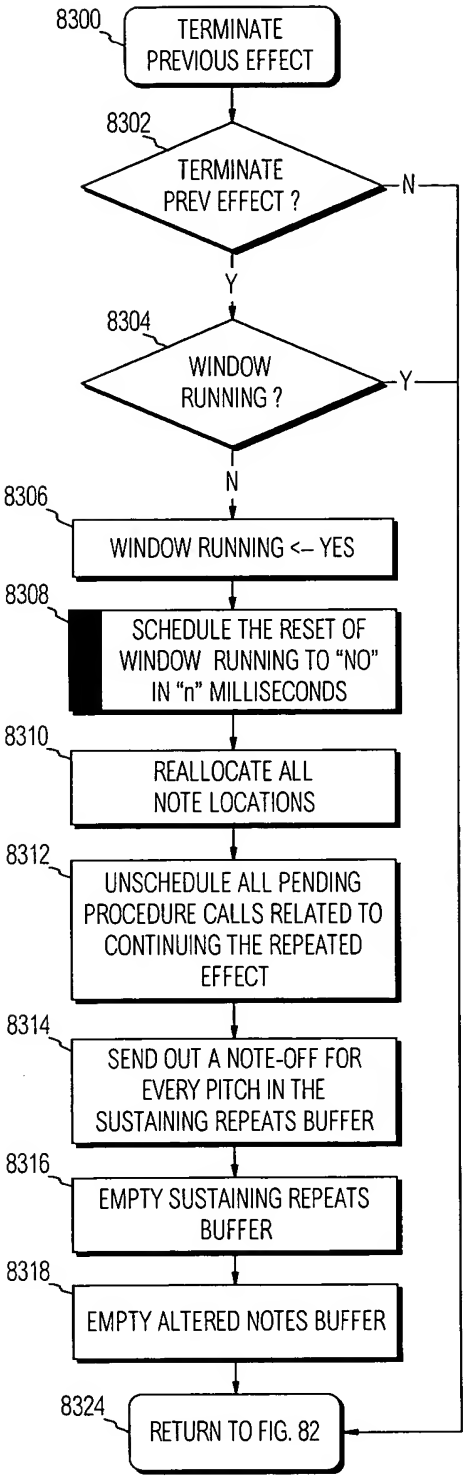

8300
TERMINATE PREVIOUS EFFECT
8302
TERMINATE PREV EFFECT ?
N
Y
8304
WINDOW RUNNING ?
Y
N
8306
WINDOW RUNNING <– YES
8308
SCHEDULE THE RESET OF WINDOW RUNNING TO "NO" IN "n" MILLISECONDS
8310
REALLOCATE ALL NOTE LOCATIONS
8312
UNSCHEDULE ALL PENDING PROCEDURE CALLS RELATED TO CONTINUING THE REPEATED EFFECT
8314
SEND OUT A NOTE-OFF FOR EVERY PITCH IN THE SUSTAINING REPEATS BUFFER
8316
EMPTY SUSTAINING REPEATS BUFFER
8318
EMPTY ALTERED NOTES BUFFER
8324
RETURN TO FIG. 82

FIG. 83

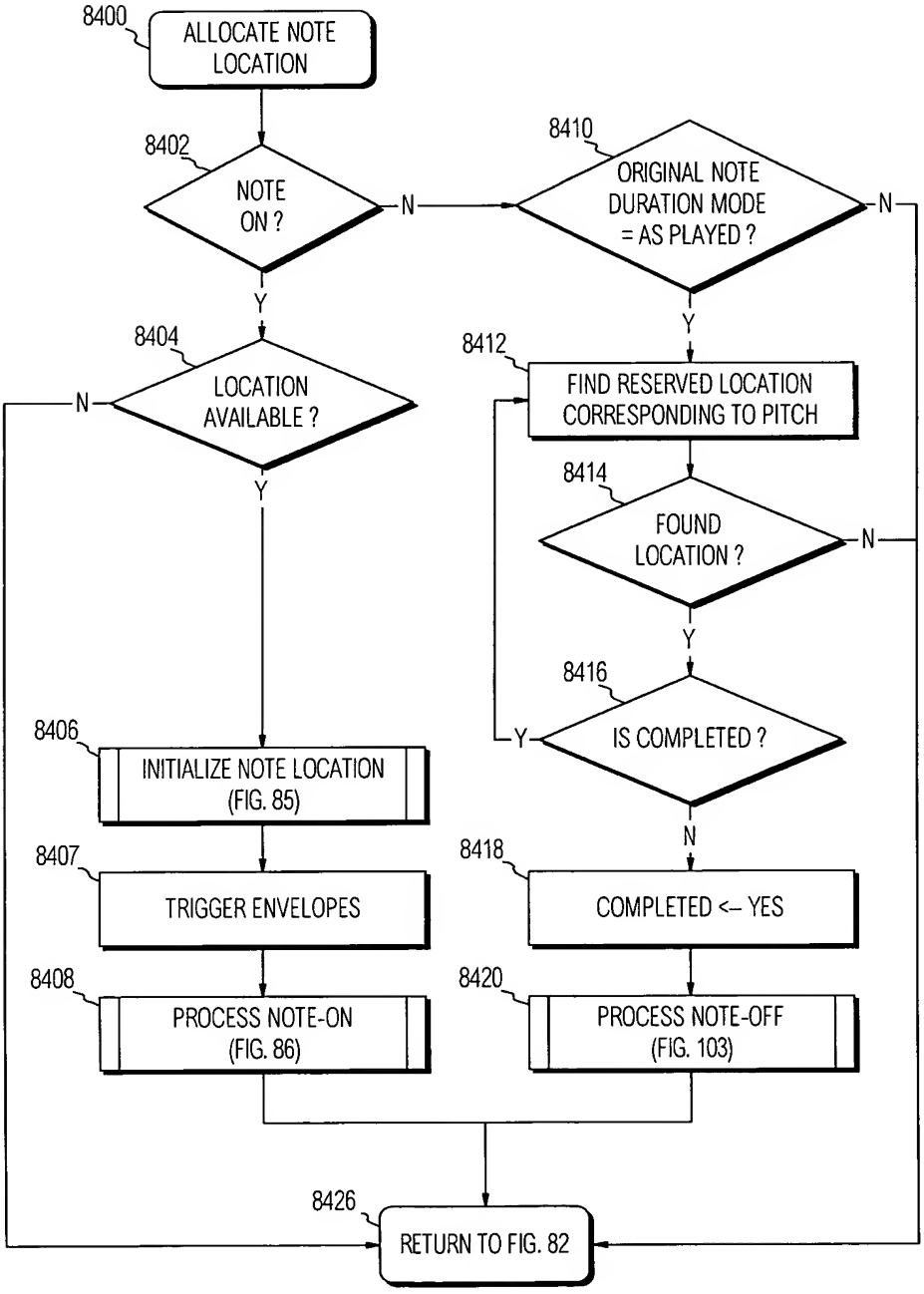

8400
ALLOCATE NOTE LOCATION
8402
NOTE ON ?
N
Y
8410
ORIGINAL NOTE DURATION MODE = AS PLAYED ?
N
Y
8404
LOCATION AVAILABLE ?
N
Y
8412
FIND RESERVED LOCATION CORRESPONDING TO PITCH
8414
FOUND LOCATION ?
N
Y
8416
IS COMPLETED ?
Y
N
8406
INITIALIZE NOTE LOCATION (FIG. 85)
8407
TRIGGER ENVELOPES
8408
PROCESS NOTE-ON (FIG. 86)
8418
COMPLETED <– YES
8420
PROCESS NOTE-OFF (FIG. 103)
8426
RETURN TO FIG. 82

FIG. 84

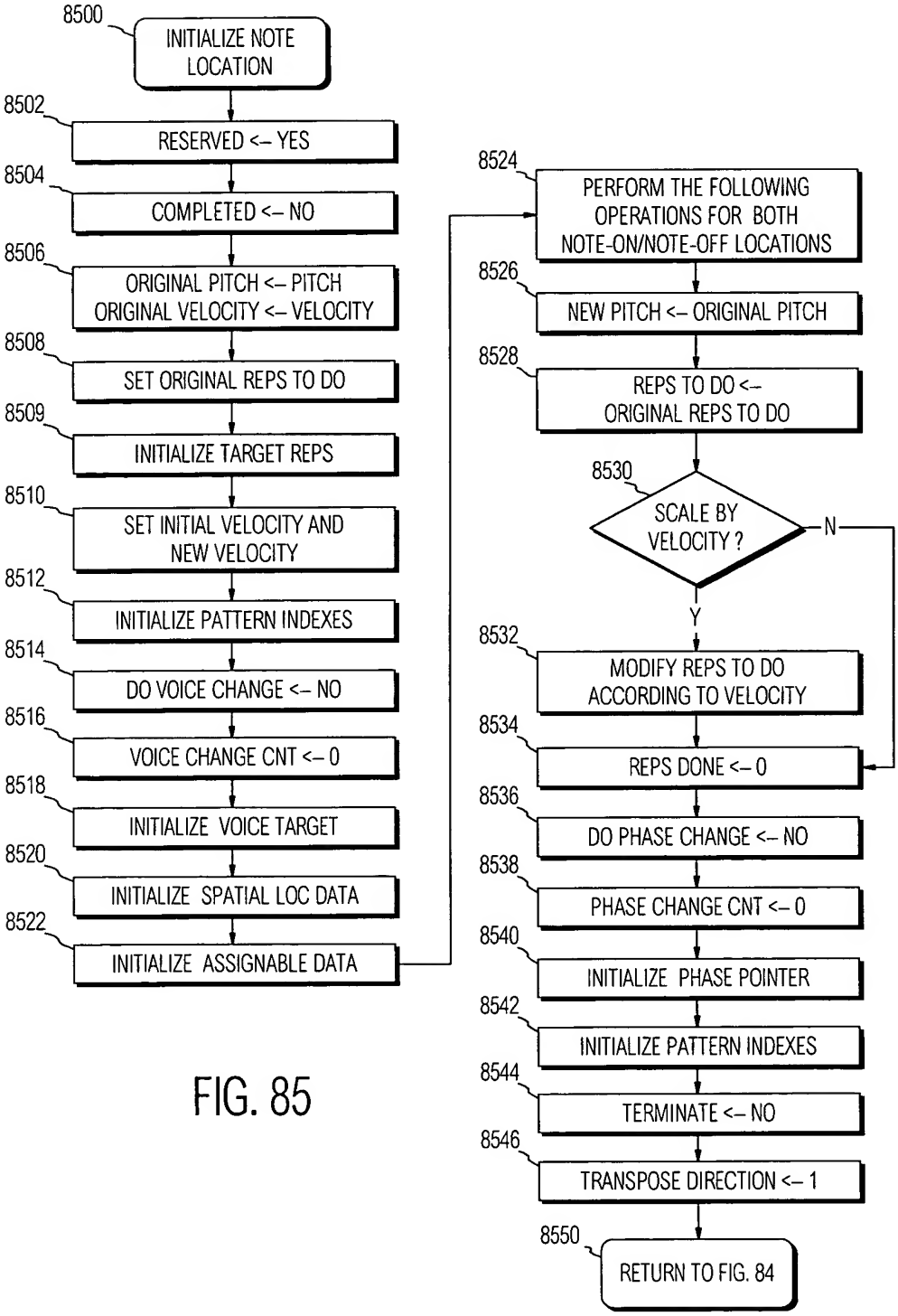

8500
INITIALIZE NOTE LOCATION
8502
RESERVED <-- YES
8504
COMPLETED <-- NO
8506
ORIGINAL PITCH <-- PITCH
ORIGINAL VELOCITY <-- VELOCITY
8508
SET ORIGINAL REPS TO DO
8509
INITIALIZE TARGET REPS
8510
SET INITIAL VELOCITY AND NEW VELOCITY
8512
INITIALIZE PATTERN INDEXES
8514
DO VOICE CHANGE <-- NO
8516
VOICE CHANGE CNT <-- 0
8518
INITIALIZE VOICE TARGET
8520
INITIALIZE SPATIAL LOC DATA
8522
INITIALIZE ASSIGNABLE DATA
8524
PERFORM THE FOLLOWING OPERATIONS FOR BOTH NOTE-ON/NOTE-OFF LOCATIONS
8526
NEW PITCH <-- ORIGINAL PITCH
8528
REPS TO DO <-- ORIGINAL REPS TO DO
8530
SCALE BY VELOCITY ?
N
Y
8532
MODIFY REPS TO DO ACCORDING TO VELOCITY
8534
REPS DONE <-- 0
8536
DO PHASE CHANGE <-- NO
8538
PHASE CHANGE CNT <-- 0
8540
INITIALIZE PHASE POINTER
8542
INITIALIZE PATTERN INDEXES
8544
TERMINATE <-- NO
8546
TRANSPOSE DIRECTION <-- 1
8550
RETURN TO FIG. 84

FIG. 85

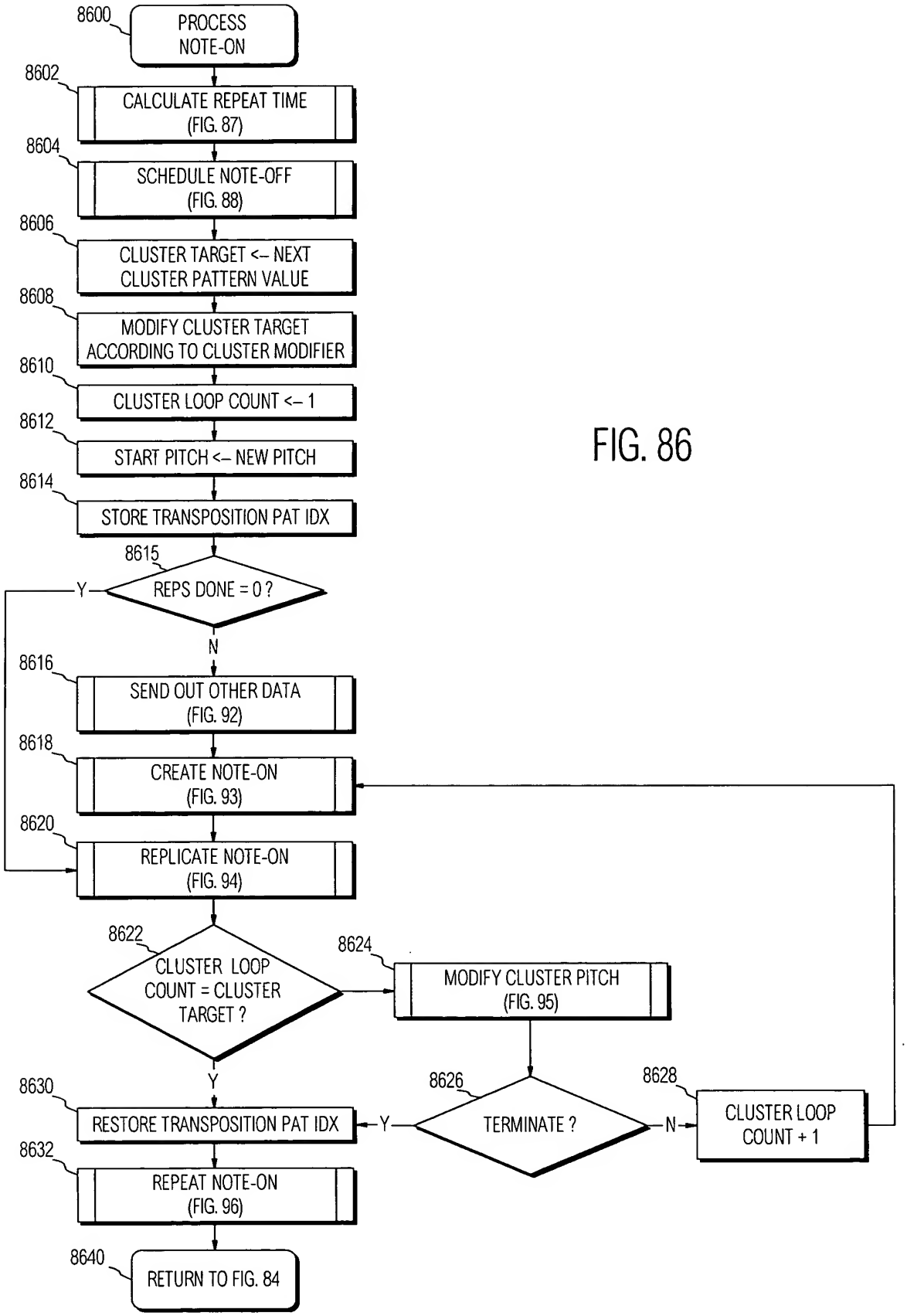

8600
PROCESS NOTE-ON
8602
CALCULATE REPEAT TIME (FIG. 87)
8604
SCHEDULE NOTE-OFF (FIG. 88)
8606
CLUSTER TARGET <– NEXT CLUSTER PATTERN VALUE
8608
MODIFY CLUSTER TARGET ACCORDING TO CLUSTER MODIFIER
8610
CLUSTER LOOP COUNT <– 1
8612
START PITCH <– NEW PITCH
8614
STORE TRANSPOSITION PAT IDX
8615
REPS DONE = 0 ?
Y
N
8616
SEND OUT OTHER DATA (FIG. 92)
8618
CREATE NOTE-ON (FIG. 93)
8620
REPLICATE NOTE-ON (FIG. 94)
8622
CLUSTER LOOP COUNT = CLUSTER TARGET ?
8624
MODIFY CLUSTER PITCH (FIG. 95)
Y
8626
TERMINATE ?
Y
N
8628
CLUSTER LOOP COUNT + 1
8630
RESTORE TRANSPOSITION PAT IDX
8632
REPEAT NOTE-ON (FIG. 96)
8640
RETURN TO FIG. 84

FIG. 86

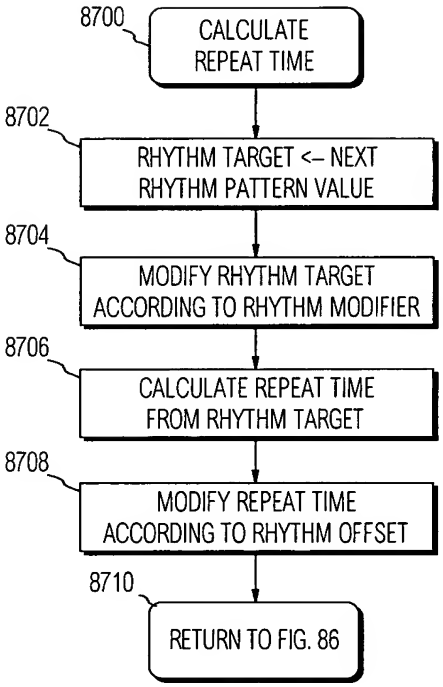

8700
CALCULATE REPEAT TIME
8702
RHYTHM TARGET <– NEXT RHYTHM PATTERN VALUE
8704
MODIFY RHYTHM TARGET ACCORDING TO RHYTHM MODIFIER
8706
CALCULATE REPEAT TIME FROM RHYTHM TARGET
8708
MODIFY REPEAT TIME ACCORDING TO RHYTHM OFFSET
8710
RETURN TO FIG. 86

FIG. 87

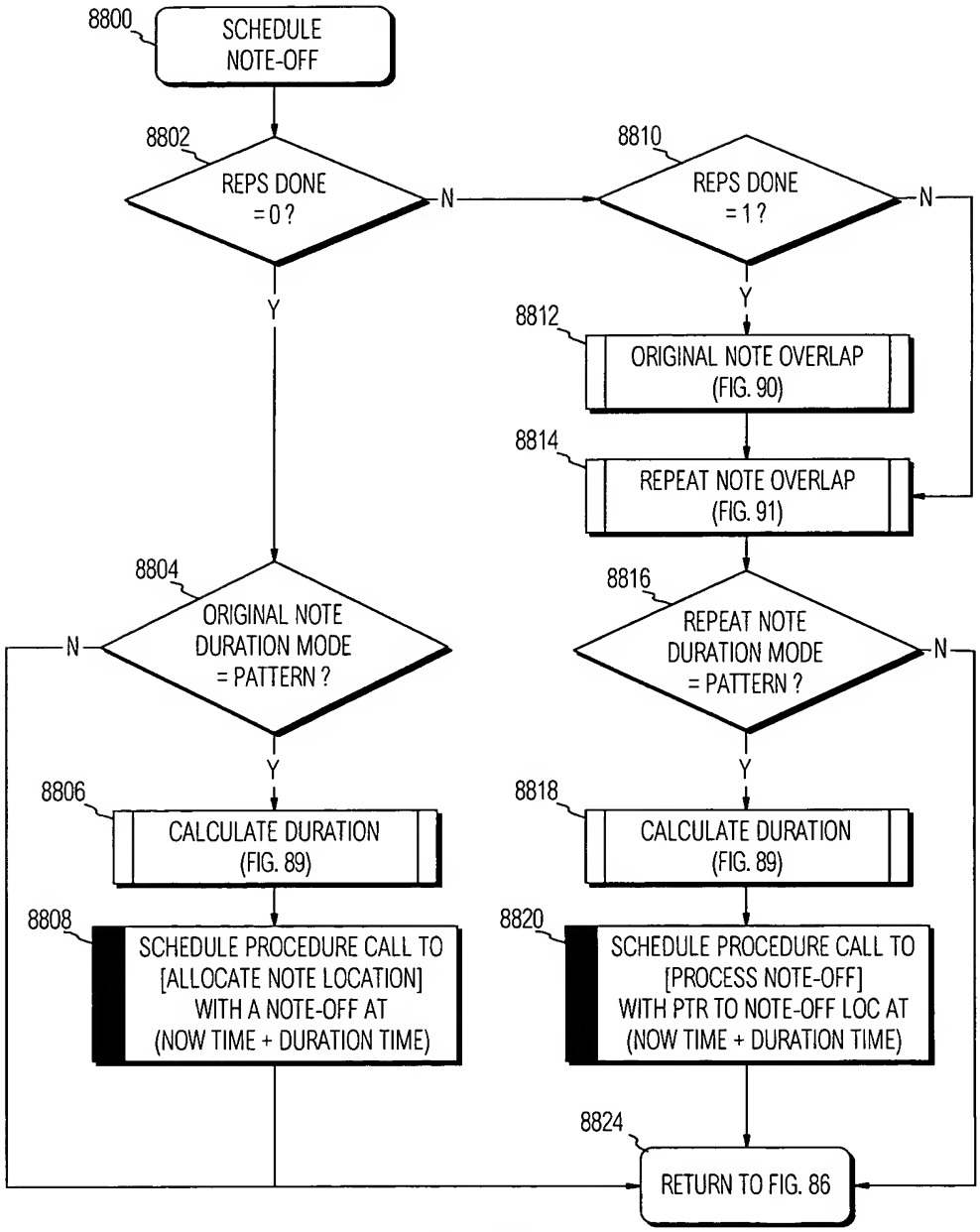

8800
SCHEDULE NOTE-OFF
8802
REPS DONE = 0 ?
N
Y
8810
REPS DONE = 1 ?
N
Y
8812
ORIGINAL NOTE OVERLAP (FIG. 90)
8814
REPEAT NOTE OVERLAP (FIG. 91)
8804
ORIGINAL NOTE DURATION MODE = PATTERN ?
N
Y
8816
REPEAT NOTE DURATION MODE = PATTERN ?
N
Y
8806
CALCULATE DURATION (FIG. 89)
8808
SCHEDULE PROCEDURE CALL TO [ALLOCATE NOTE LOCATION] WITH A NOTE-OFF AT (NOW TIME + DURATION TIME)
8818
CALCULATE DURATION (FIG. 89)
8820
SCHEDULE PROCEDURE CALL TO [PROCESS NOTE-OFF] WITH PTR TO NOTE-OFF LOC AT (NOW TIME + DURATION TIME)
8824
RETURN TO FIG. 86

FIG. 88

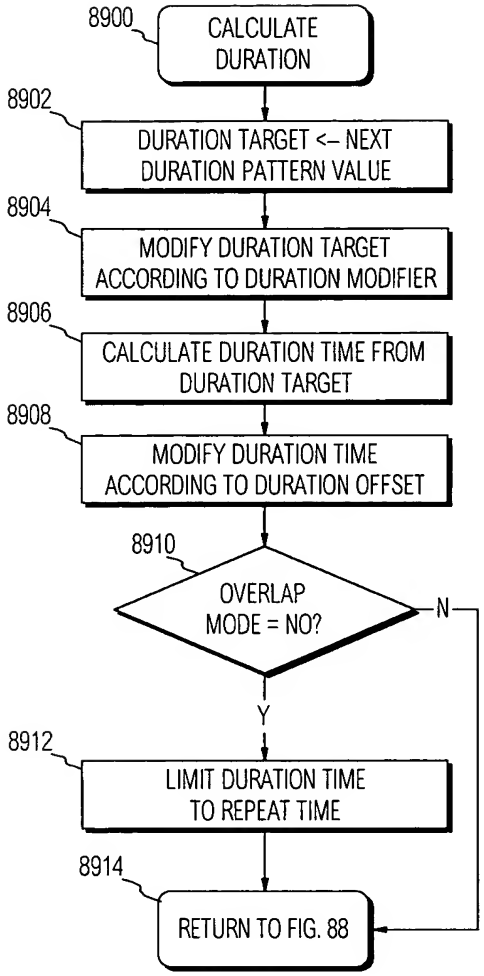

8900
CALCULATE DURATION
8902
DURATION TARGET <– NEXT DURATION PATTERN VALUE
8904
MODIFY DURATION TARGET ACCORDING TO DURATION MODIFIER
8906
CALCULATE DURATION TIME FROM DURATION TARGET
8908
MODIFY DURATION TIME ACCORDING TO DURATION OFFSET
8910
OVERLAP MODE = NO?
N
Y
8912
LIMIT DURATION TIME TO REPEAT TIME
8914
RETURN TO FIG. 88

FIG. 89

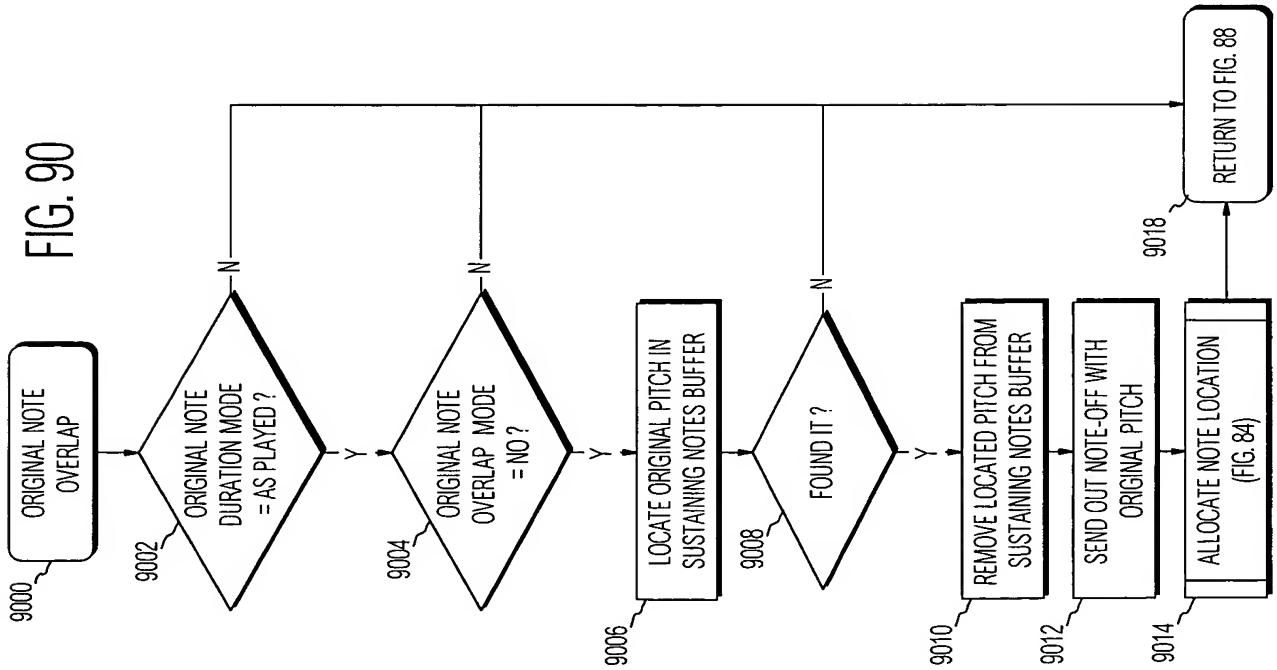

9000
ORIGINAL NOTE OVERLAP
9002
ORIGINAL NOTE DURATION MODE = AS PLAYED ?
9004
ORIGINAL NOTE OVERLAP MODE = NO ?
9006
LOCATE ORIGINAL PITCH IN SUSTAINING NOTES BUFFER
9008
FOUND IT ?
9010
REMOVE LOCATED PITCH FROM SUSTAINING NOTES BUFFER
9012
SEND OUT NOTE-OFF WITH ORIGINAL PITCH
9014
ALLOCATE NOTE LOCATION (FIG. 84)
9018
RETURN TO FIG. 88
N
Y

FIG. 90

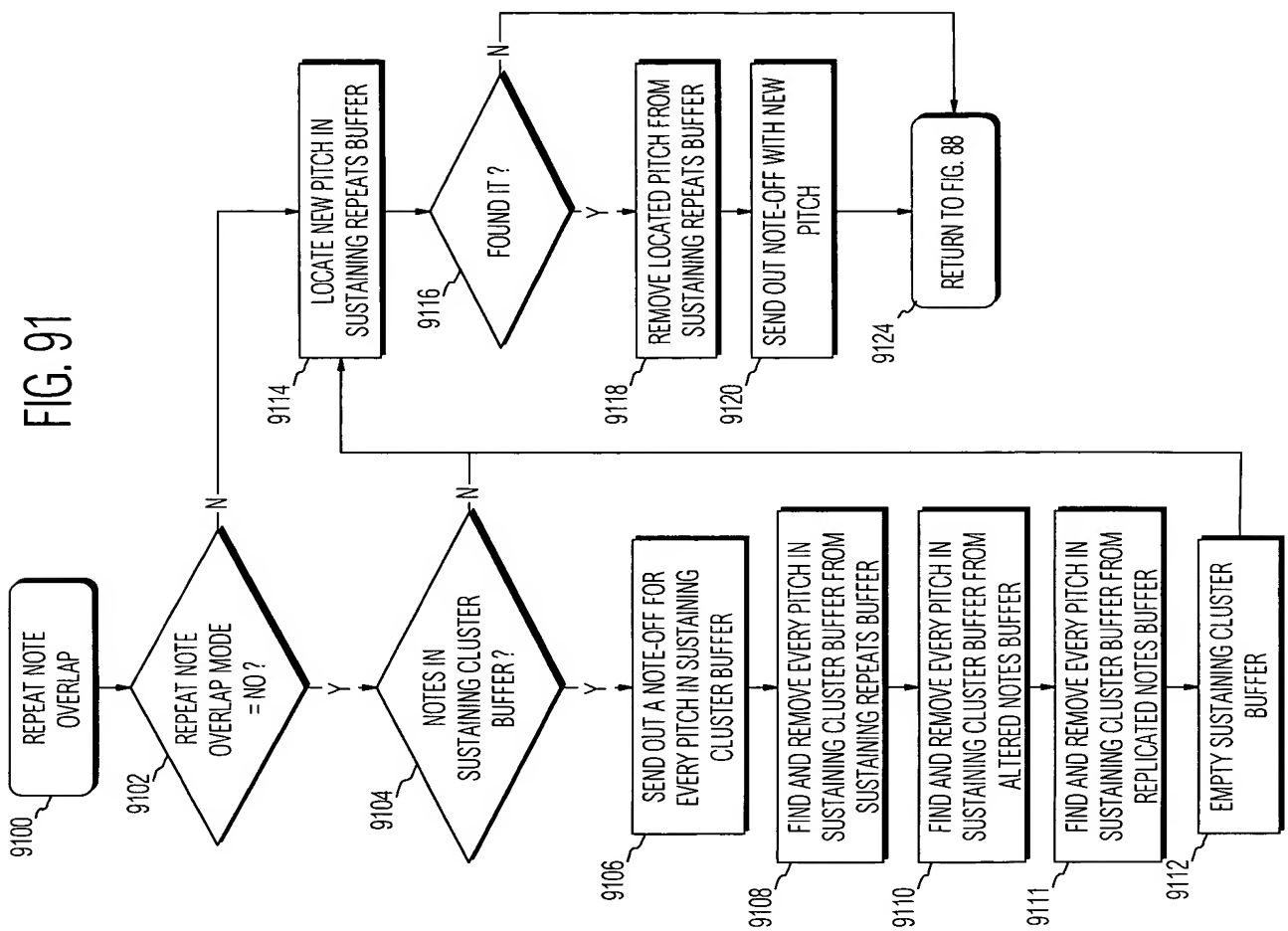

9100
REPEAT NOTE OVERLAP
9102
REPEAT NOTE OVERLAP MODE = NO ?
9104
NOTES IN SUSTAINING CLUSTER BUFFER ?
9106
SEND OUT A NOTE-OFF FOR EVERY PITCH IN SUSTAINING CLUSTER BUFFER
9108
FIND AND REMOVE EVERY PITCH IN SUSTAINING CLUSTER BUFFER FROM SUSTAINING REPEATS BUFFER
9110
FIND AND REMOVE EVERY PITCH IN SUSTAINING CLUSTER BUFFER FROM ALTERED NOTES BUFFER
9111
FIND AND REMOVE EVERY PITCH IN SUSTAINING CLUSTER BUFFER FROM REPLICATED NOTES BUFFER
9112
EMPTY SUSTAINING CLUSTER BUFFER
9114
LOCATE NEW PITCH IN SUSTAINING REPEATS BUFFER
9116
FOUND IT ?
9118
REMOVE LOCATED PITCH FROM SUSTAINING REPEATS BUFFER
9120
SEND OUT NOTE-OFF WITH NEW PITCH
9124
RETURN TO FIG. 88
N
Y

FIG. 91

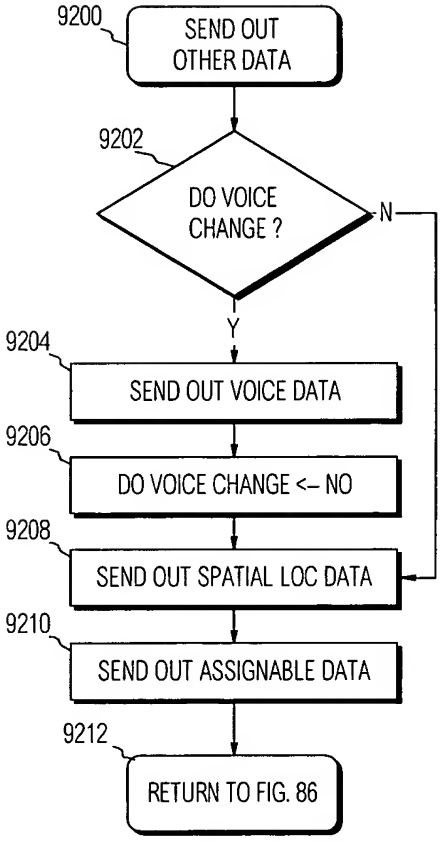

9200
SEND OUT OTHER DATA
9202
DO VOICE CHANGE ?
N
Y
9204
SEND OUT VOICE DATA
9206
DO VOICE CHANGE <– NO
9208
SEND OUT SPATIAL LOC DATA
9210
SEND OUT ASSIGNABLE DATA
9212
RETURN TO FIG. 86

FIG. 92

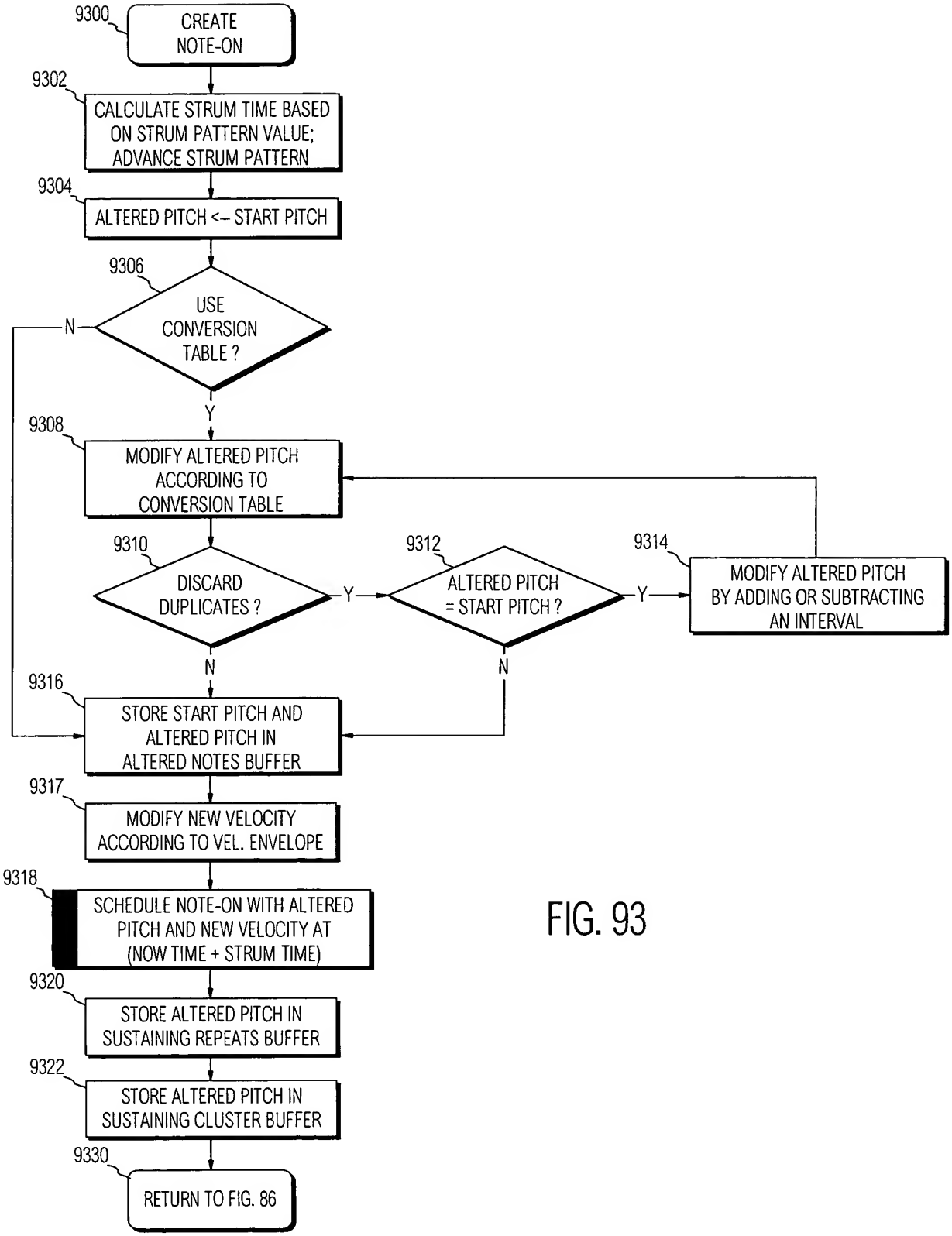

9300
CREATE NOTE-ON
9302
CALCULATE STRUM TIME BASED ON STRUM PATTERN VALUE; ADVANCE STRUM PATTERN
9304
ALTERED PITCH <– START PITCH
9306
USE CONVERSION TABLE ?
N
Y
9308
MODIFY ALTERED PITCH ACCORDING TO CONVERSION TABLE
9310
DISCARD DUPLICATES ?
Y
9312
ALTERED PITCH = START PITCH ?
Y
9314
MODIFY ALTERED PITCH BY ADDING OR SUBTRACTING AN INTERVAL
N
N
9316
STORE START PITCH AND ALTERED PITCH IN ALTERED NOTES BUFFER
9317
MODIFY NEW VELOCITY ACCORDING TO VEL. ENVELOPE
9318
SCHEDULE NOTE-ON WITH ALTERED PITCH AND NEW VELOCITY AT (NOW TIME + STRUM TIME)
9320
STORE ALTERED PITCH IN SUSTAINING REPEATS BUFFER
9322
STORE ALTERED PITCH IN SUSTAINING CLUSTER BUFFER
9330
RETURN TO FIG. 86

FIG. 93

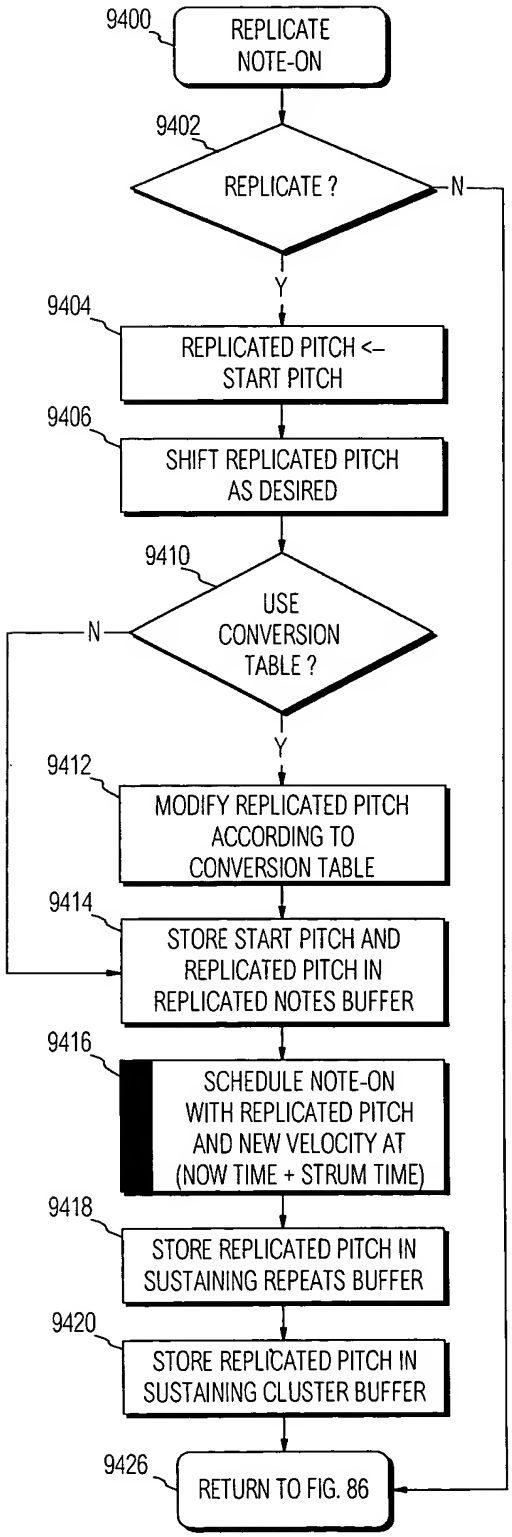

9400
REPLICATE NOTE-ON
9402
REPLICATE ?
N
Y
9404
REPLICATED PITCH <– START PITCH
9406
SHIFT REPLICATED PITCH AS DESIRED
9410
USE CONVERSION TABLE ?
N
Y
9412
MODIFY REPLICATED PITCH ACCORDING TO CONVERSION TABLE
9414
STORE START PITCH AND REPLICATED PITCH IN REPLICATED NOTES BUFFER
9416
SCHEDULE NOTE-ON WITH REPLICATED PITCH AND NEW VELOCITY AT (NOW TIME + STRUM TIME)
9418
STORE REPLICATED PITCH IN SUSTAINING REPEATS BUFFER
9420
STORE REPLICATED PITCH IN SUSTAINING CLUSTER BUFFER
9426
RETURN TO FIG. 86

FIG. 94

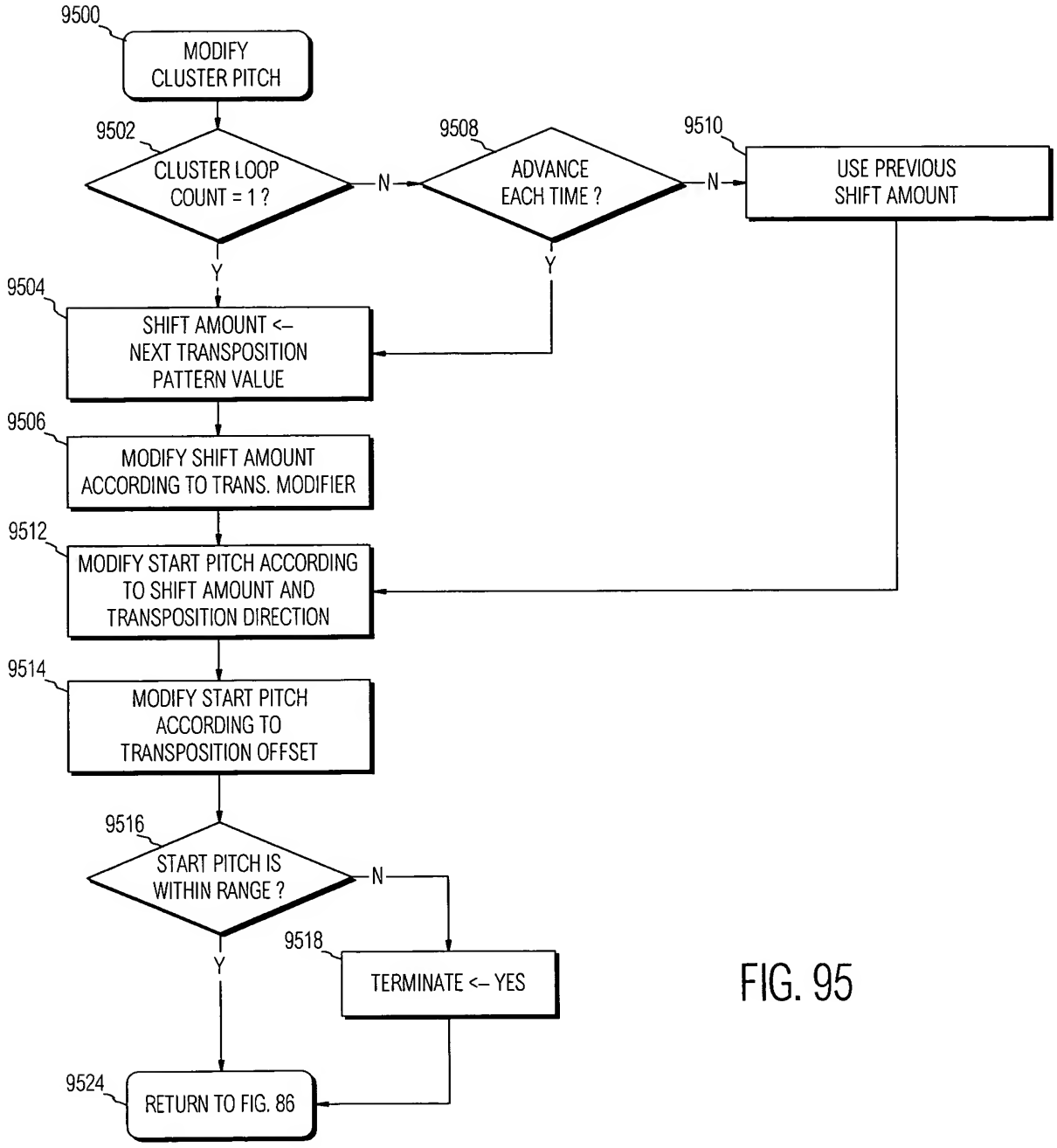
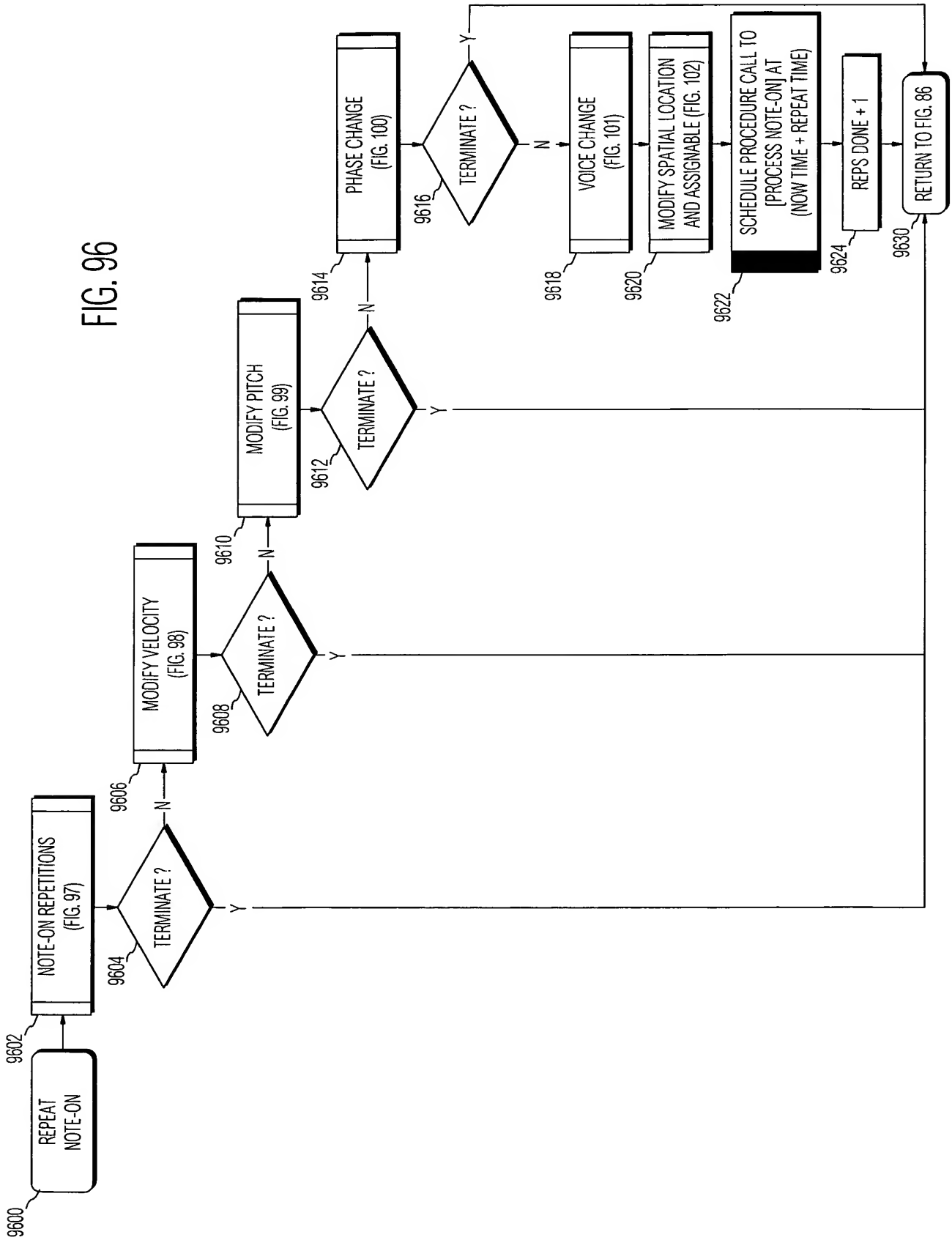

9500
MODIFY CLUSTER PITCH
9502
CLUSTER LOOP COUNT = 1 ?
N
9508
ADVANCE EACH TIME ?
N
9510
USE PREVIOUS SHIFT AMOUNT
Y
Y
9504
SHIFT AMOUNT <– NEXT TRANSPOSITION PATTERN VALUE
9506
MODIFY SHIFT AMOUNT ACCORDING TO TRANS. MODIFIER
9512
MODIFY START PITCH ACCORDING TO SHIFT AMOUNT AND TRANSPOSITION DIRECTION
9514
MODIFY START PITCH ACCORDING TO TRANSPOSITION OFFSET
9516
START PITCH IS WITHIN RANGE ?
N
9518
TERMINATE <– YES
Y
9524
RETURN TO FIG. 86

FIG. 95

FIG. 96


9600
REPEAT NOTE-ON
9602
NOTE-ON REPETITIONS (FIG. 97)
9604
TERMINATE ?
Y
N
9606
MODIFY VELOCITY (FIG. 98)
9608
TERMINATE ?
Y
N
9610
MODIFY PITCH (FIG. 99)
9612
TERMINATE ?
Y
N
9614
PHASE CHANGE (FIG. 100)
9616
TERMINATE ?
Y
N
9618
VOICE CHANGE (FIG. 101)
9620
MODIFY SPATIAL LOCATION AND ASSIGNABLE (FIG. 102)
9622
SCHEDULE PROCEDURE CALL TO [PROCESS NOTE-ON] AT (NOW TIME + REPEAT TIME)
9624
REPS DONE + 1
9630
RETURN TO FIG. 86

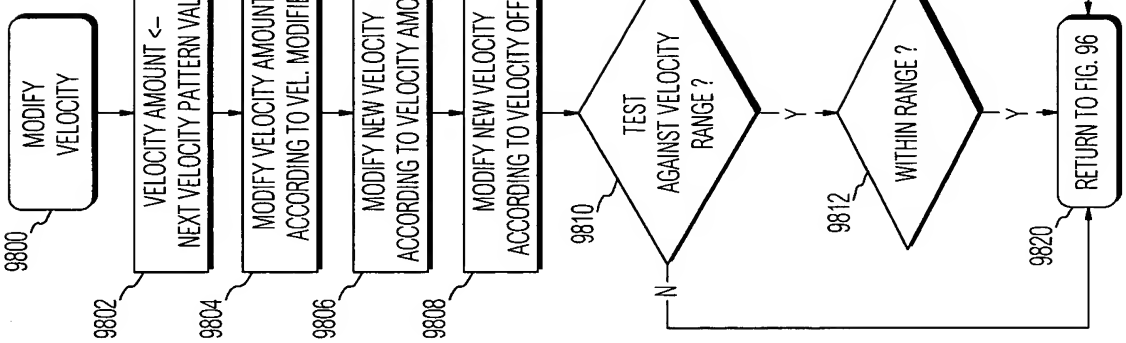

9800
MODIFY VELOCITY
9802
VELOCITY AMOUNT <- NEXT VELOCITY PATTERN VALUE
9804
MODIFY VELOCITY AMOUNT ACCORDING TO VEL. MODIFIER
9806
MODIFY NEW VELOCITY ACCORDING TO VELOCITY AMOUNT
9808
MODIFY NEW VELOCITY ACCORDING TO VELOCITY OFFSET
9810
TEST AGAINST VELOCITY RANGE ?
N
Y
9812
WITHIN RANGE ?
N
Y
9814
TERMINATE <- YES
9820
RETURN TO FIG. 96

FIG. 98

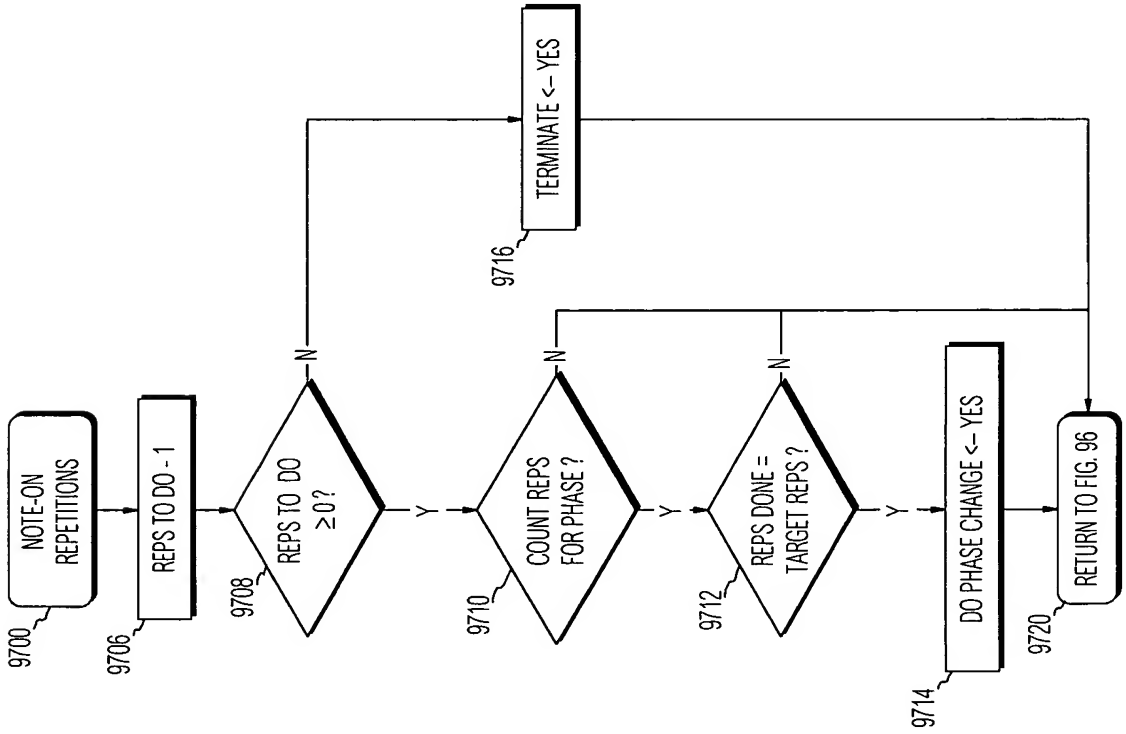

9700
NOTE-ON REPETITIONS
9706
REPS TO DO - 1
9708
REPS TO DO ≥ 0 ?
N
Y
9716
TERMINATE <- YES
9710
COUNT REPS FOR PHASE ?
N
Y
9712
REPS DONE = TARGET REPS ?
N
Y
9714
DO PHASE CHANGE <- YES
9720
RETURN TO FIG. 96

FIG. 97

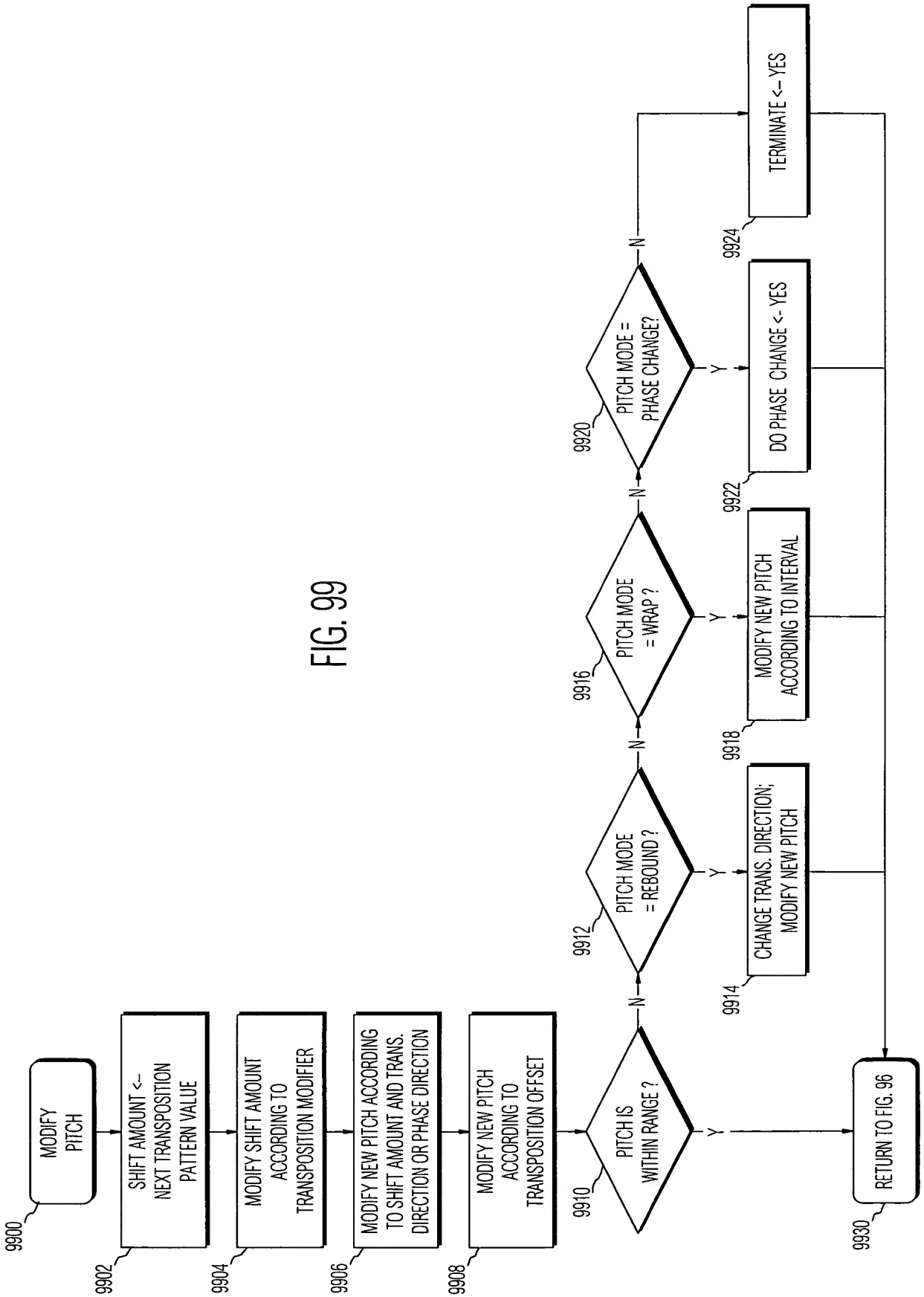

9900
MODIFY PITCH
9902
SHIFT AMOUNT <- NEXT TRANSPOSITION PATTERN VALUE
9904
MODIFY SHIFT AMOUNT ACCORDING TO TRANSPOSITION MODIFIER
9906
MODIFY NEW PITCH ACCORDING TO SHIFT AMOUNT AND TRANS. DIRECTION OR PHASE DIRECTION
9908
MODIFY NEW PITCH ACCORDING TO TRANSPOSITION OFFSET
9910
PITCH IS WITHIN RANGE ?
9912
PITCH MODE = REBOUND ?
9914
CHANGE TRANS. DIRECTION; MODIFY NEW PITCH
9916
PITCH MODE = WRAP ?
9918
MODIFY NEW PITCH ACCORDING TO INTERVAL
9920
PITCH MODE = PHASE CHANGE?
9922
DO PHASE CHANGE <- YES
9924
TERMINATE <- YES
9930
RETURN TO FIG. 96
Y
N

FIG. 99

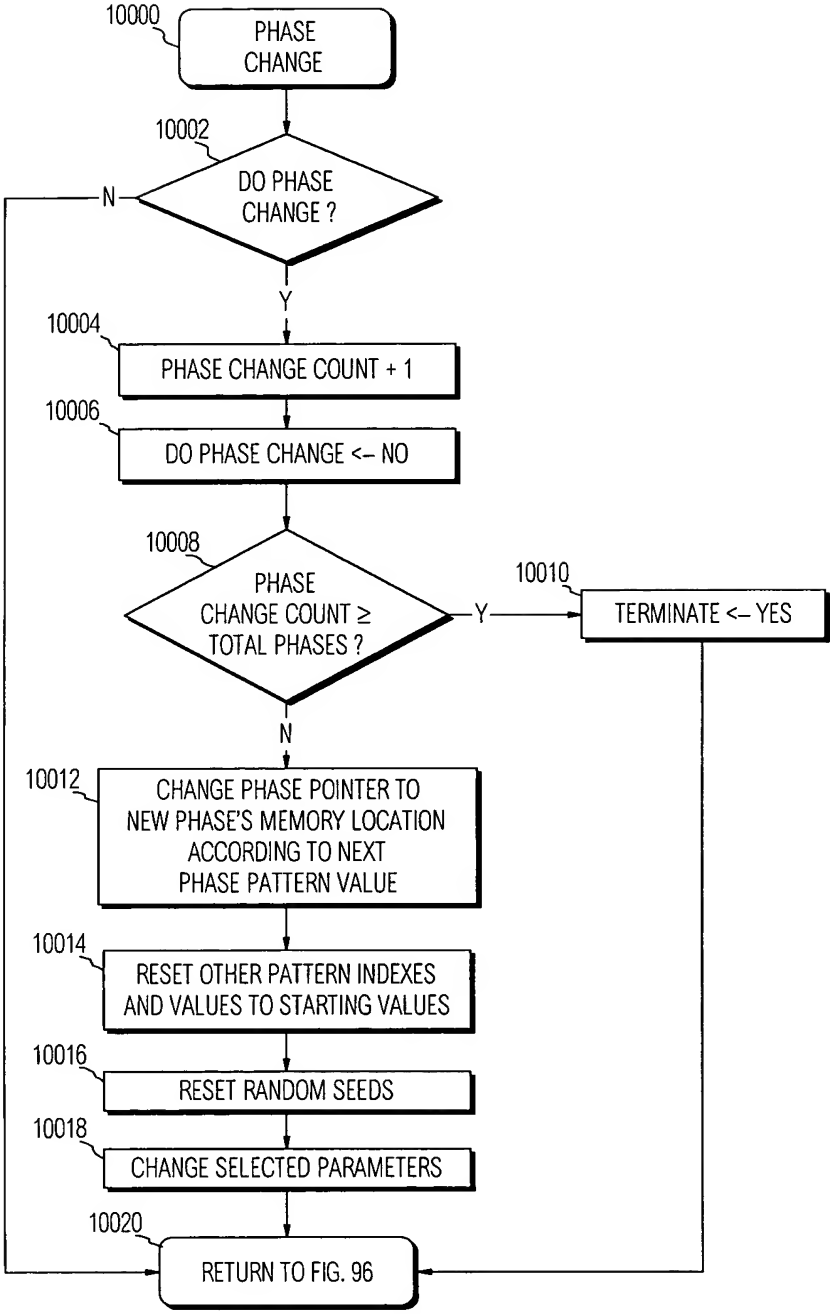

10000
PHASE CHANGE
10002
DO PHASE CHANGE ?
N
Y
10004
PHASE CHANGE COUNT + 1
10006
DO PHASE CHANGE <– NO
10008
PHASE CHANGE COUNT ≥ TOTAL PHASES ?
Y
10010
TERMINATE <– YES
N
10012
CHANGE PHASE POINTER TO NEW PHASE'S MEMORY LOCATION ACCORDING TO NEXT PHASE PATTERN VALUE
10014
RESET OTHER PATTERN INDEXES AND VALUES TO STARTING VALUES
10016
RESET RANDOM SEEDS
10018
CHANGE SELECTED PARAMETERS
10020
RETURN TO FIG. 96

FIG. 100

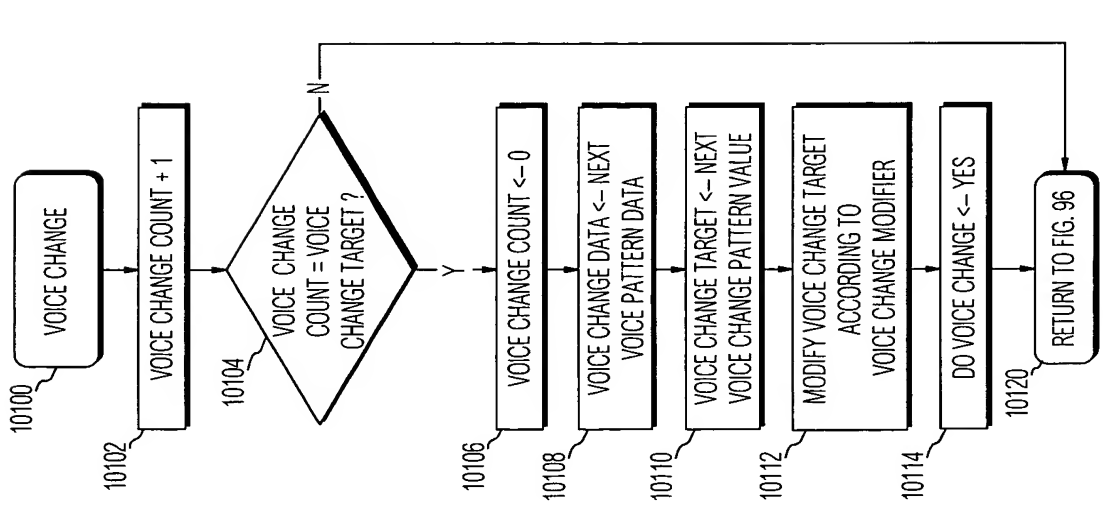


FIG. 101

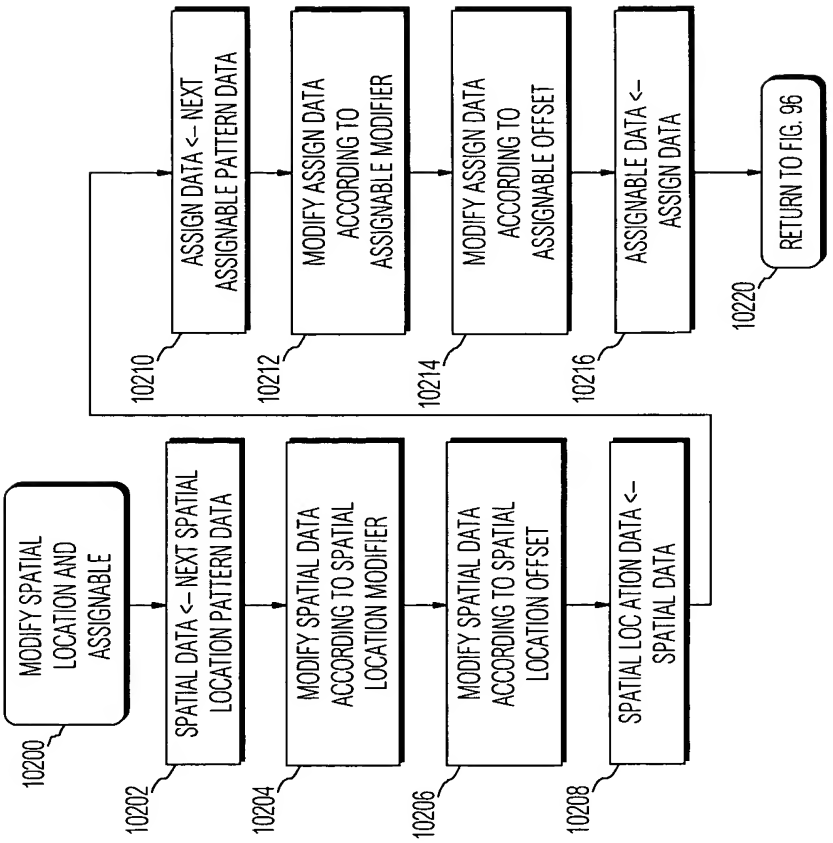


FIG. 102

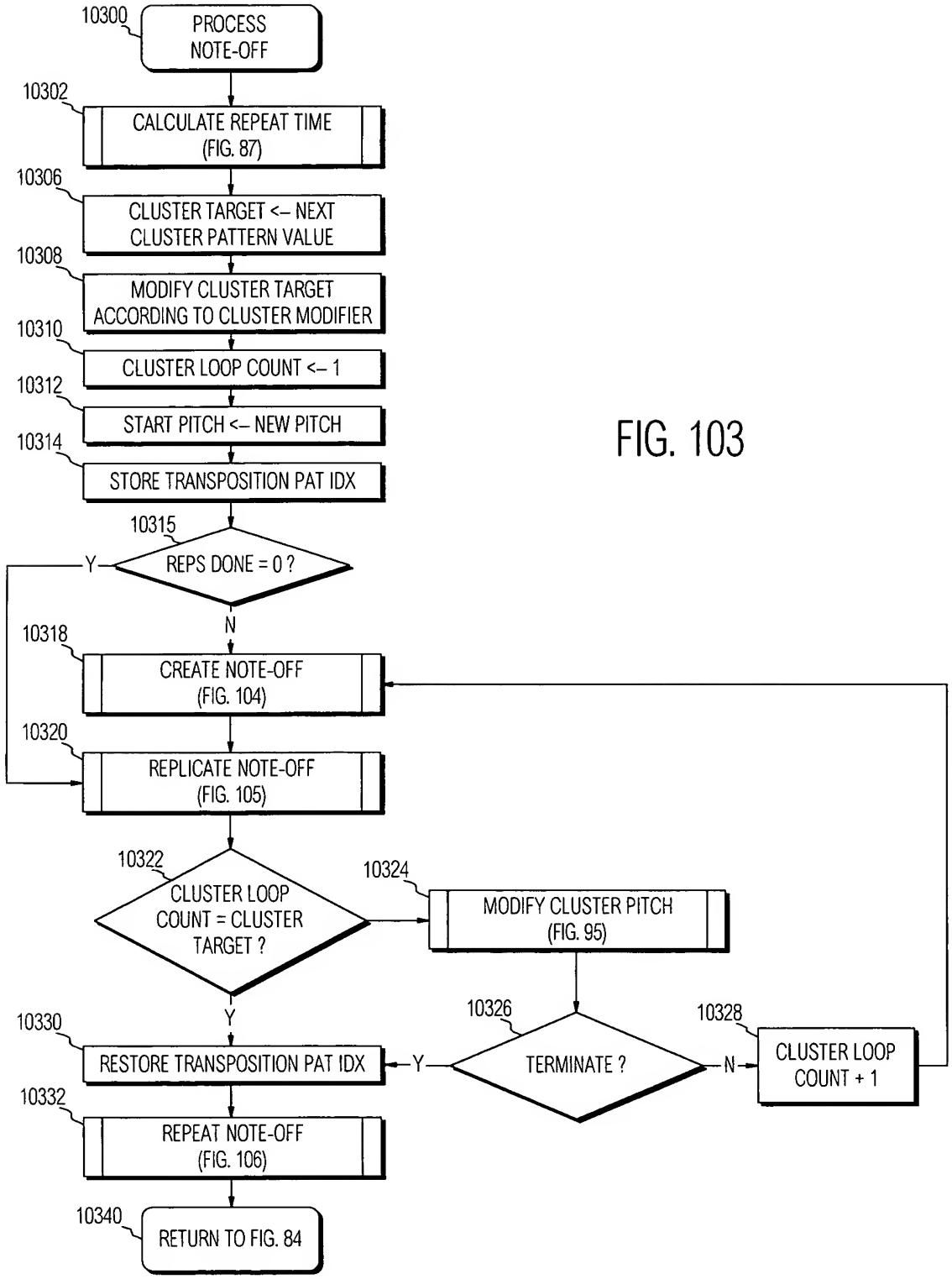

10300
PROCESS NOTE-OFF
10302
CALCULATE REPEAT TIME (FIG. 87)
10306
CLUSTER TARGET <– NEXT CLUSTER PATTERN VALUE
10308
MODIFY CLUSTER TARGET ACCORDING TO CLUSTER MODIFIER
10310
CLUSTER LOOP COUNT <– 1
10312
START PITCH <– NEW PITCH
10314
STORE TRANSPOSITION PAT IDX
10315
REPS DONE = 0 ?
Y
N
10318
CREATE NOTE-OFF (FIG. 104)
10320
REPLICATE NOTE-OFF (FIG. 105)
10322
CLUSTER LOOP COUNT = CLUSTER TARGET ?
10324
MODIFY CLUSTER PITCH (FIG. 95)
Y
10326
TERMINATE ?
Y
N
10328
CLUSTER LOOP COUNT + 1
10330
RESTORE TRANSPOSITION PAT IDX
10332
REPEAT NOTE-OFF (FIG. 106)
10340
RETURN TO FIG. 84

FIG. 103

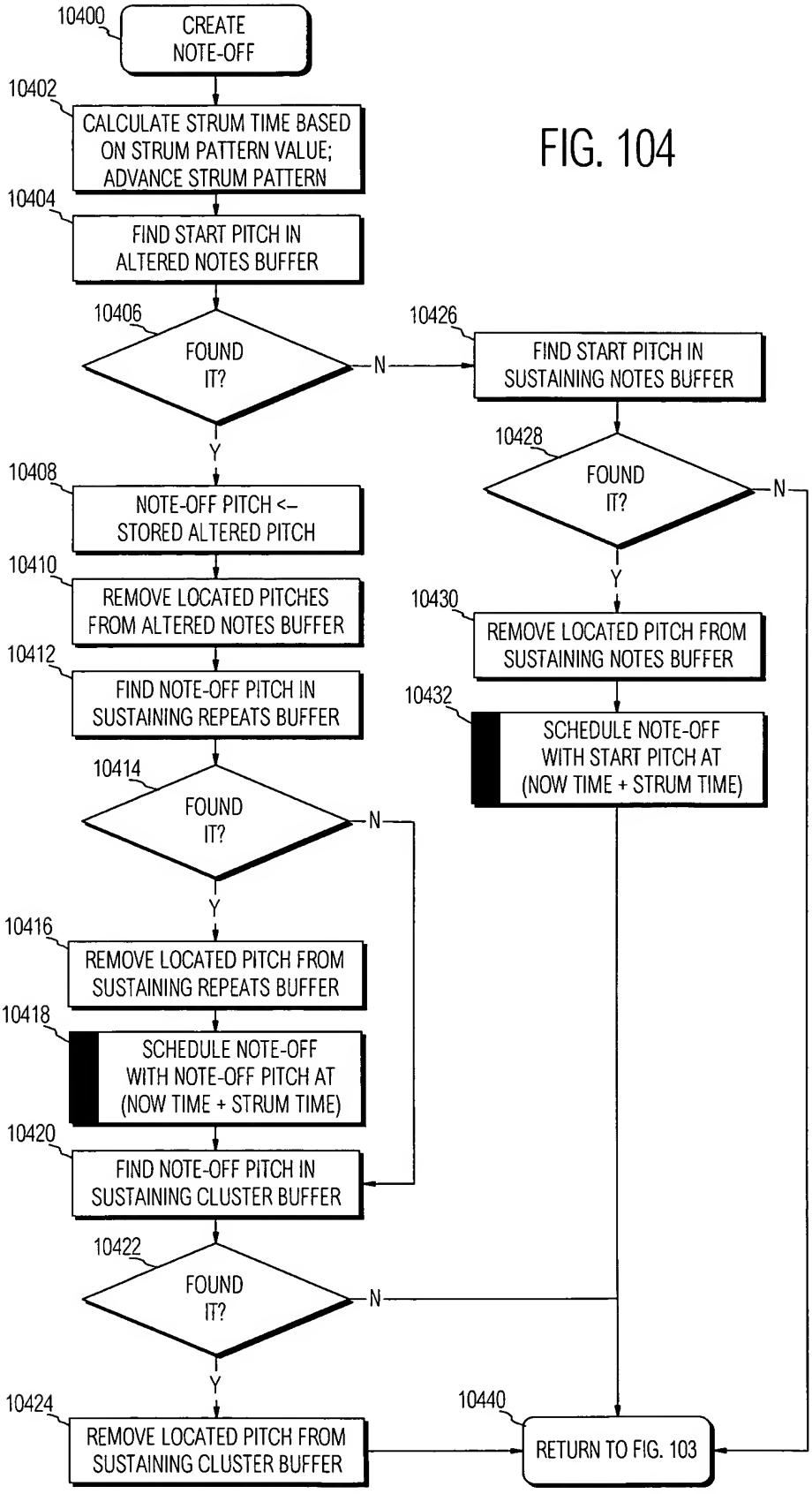

10400
CREATE NOTE-OFF
10402
CALCULATE STRUM TIME BASED ON STRUM PATTERN VALUE; ADVANCE STRUM PATTERN
10404
FIND START PITCH IN ALTERED NOTES BUFFER
10406
FOUND IT?
N
Y
10408
NOTE-OFF PITCH <– STORED ALTERED PITCH
10410
REMOVE LOCATED PITCHES FROM ALTERED NOTES BUFFER
10412
FIND NOTE-OFF PITCH IN SUSTAINING REPEATS BUFFER
10414
FOUND IT?
N
Y
10416
REMOVE LOCATED PITCH FROM SUSTAINING REPEATS BUFFER
10418
SCHEDULE NOTE-OFF WITH NOTE-OFF PITCH AT (NOW TIME + STRUM TIME)
10420
FIND NOTE-OFF PITCH IN SUSTAINING CLUSTER BUFFER
10422
FOUND IT?
N
Y
10424
REMOVE LOCATED PITCH FROM SUSTAINING CLUSTER BUFFER
10426
FIND START PITCH IN SUSTAINING NOTES BUFFER
10428
FOUND IT?
N
Y
10430
REMOVE LOCATED PITCH FROM SUSTAINING NOTES BUFFER
10432
SCHEDULE NOTE-OFF WITH START PITCH AT (NOW TIME + STRUM TIME)
10440
RETURN TO FIG. 103

FIG. 104

FIG. 105

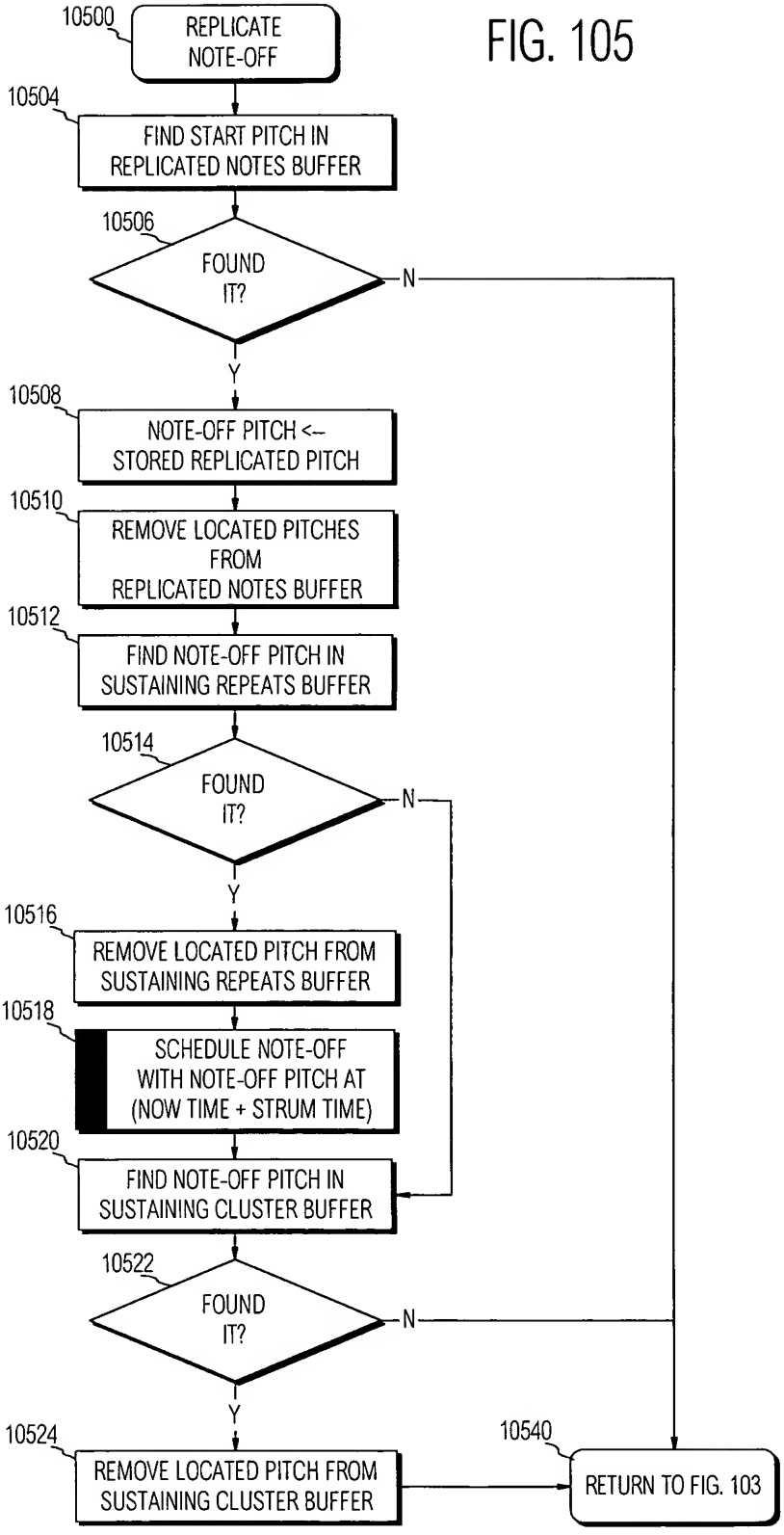
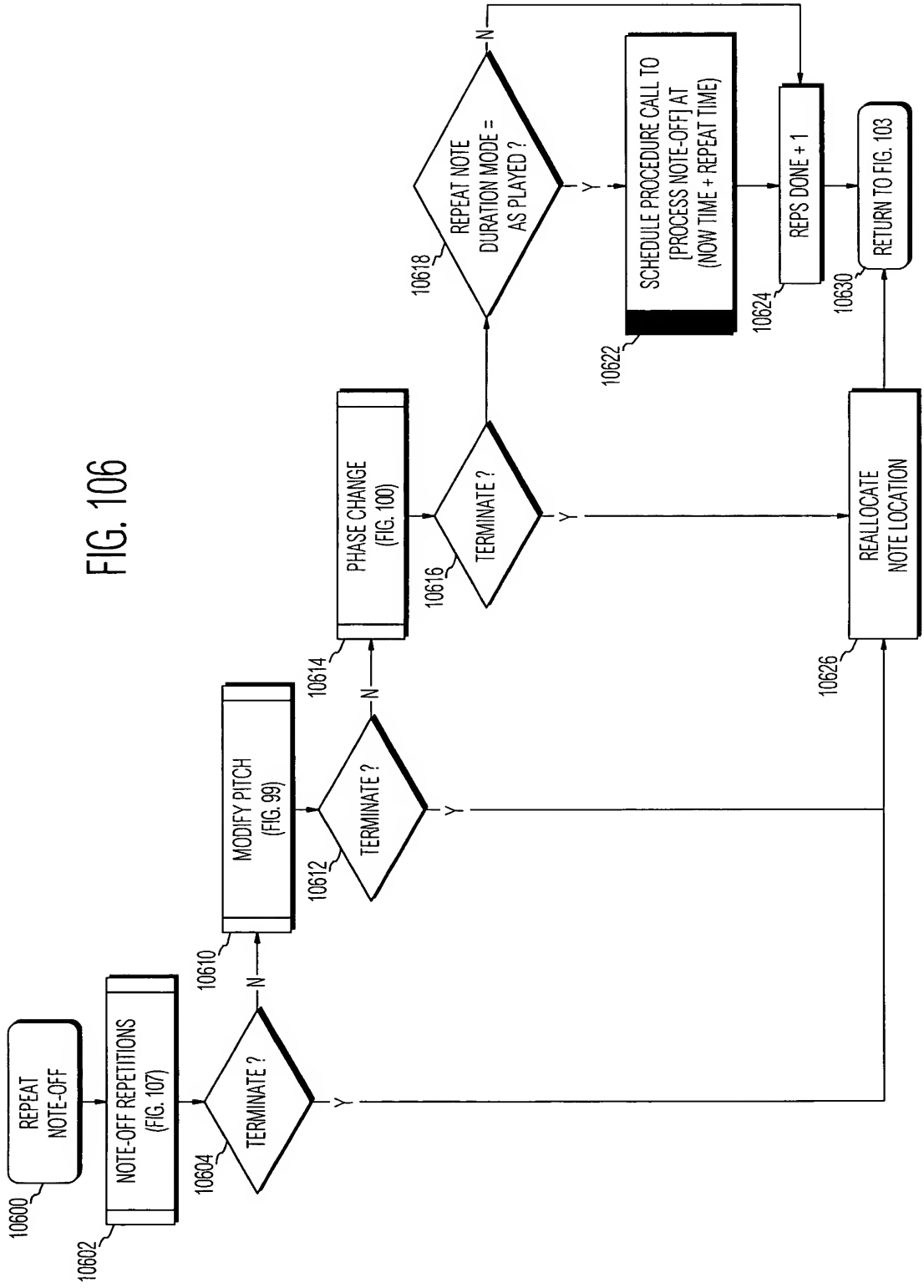

10500
REPLICATE NOTE-OFF
10504
FIND START PITCH IN REPLICATED NOTES BUFFER
10506
FOUND IT?
N
Y
10508
NOTE-OFF PITCH <-- STORED REPLICATED PITCH
10510
REMOVE LOCATED PITCHES FROM REPLICATED NOTES BUFFER
10512
FIND NOTE-OFF PITCH IN SUSTAINING REPEATS BUFFER
10514
FOUND IT?
N
Y
10516
REMOVE LOCATED PITCH FROM SUSTAINING REPEATS BUFFER
10518
SCHEDULE NOTE-OFF WITH NOTE-OFF PITCH AT (NOW TIME + STRUM TIME)
10520
FIND NOTE-OFF PITCH IN SUSTAINING CLUSTER BUFFER
10522
FOUND IT?
N
Y
10524
REMOVE LOCATED PITCH FROM SUSTAINING CLUSTER BUFFER
10540
RETURN TO FIG. 103

FIG. 106


10600
REPEAT NOTE-OFF
10602
NOTE-OFF REPETITIONS (FIG. 107)
10604
TERMINATE ?
Y
N
10610
MODIFY PITCH (FIG. 99)
10612
TERMINATE ?
Y
N
10614
PHASE CHANGE (FIG. 100)
10616
TERMINATE ?
Y
N
10618
REPEAT NOTE DURATION MODE = AS PLAYED ?
Y
N
10622
SCHEDULE PROCEDURE CALL TO [PROCESS NOTE-OFF] AT (NOW TIME + REPEAT TIME)
10624
REPS DONE + 1
10626
REALLOCATE NOTE LOCATION
10630
RETURN TO FIG. 103

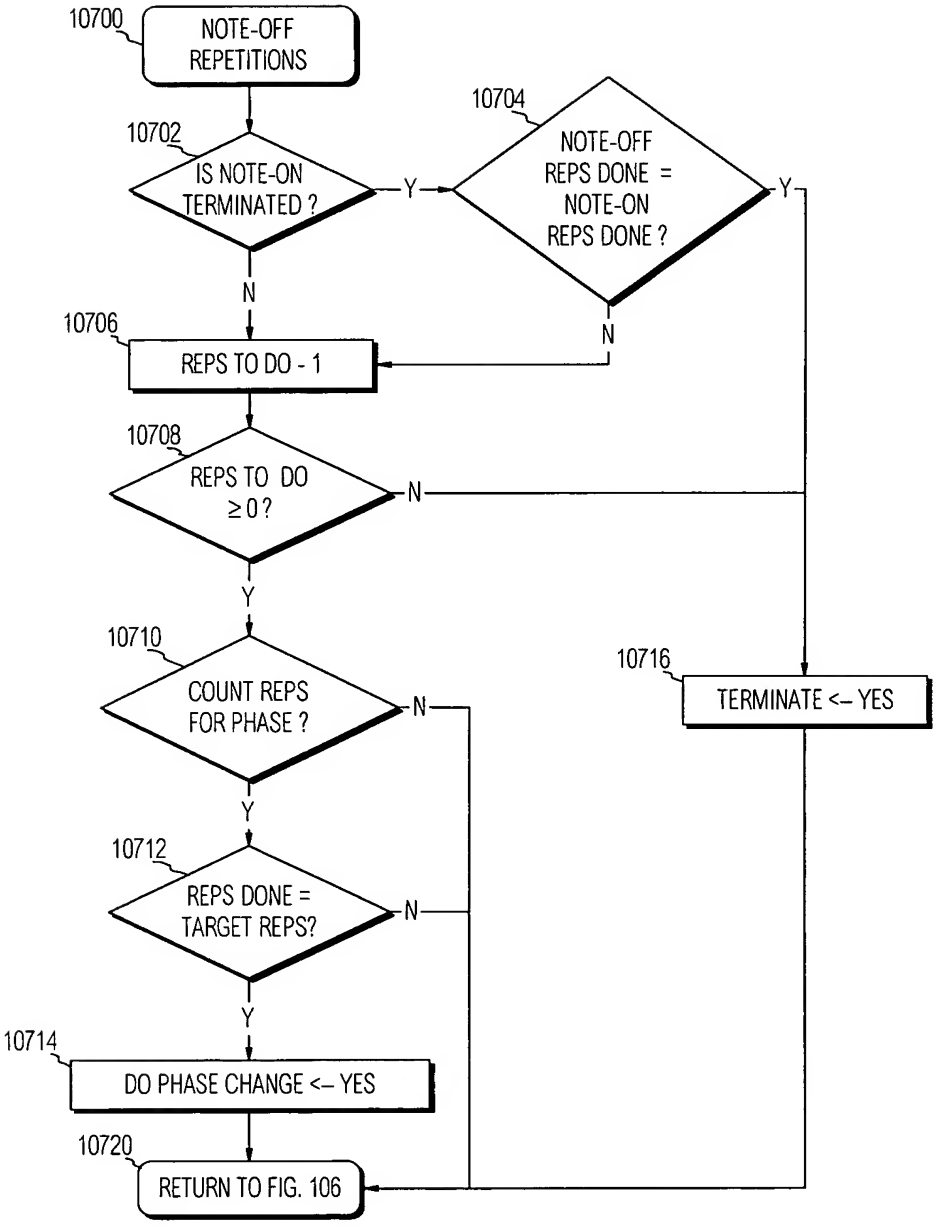

10700
NOTE-OFF REPETITIONS
10702
IS NOTE-ON TERMINATED ?
Y
10704
NOTE-OFF REPS DONE = NOTE-ON REPS DONE ?
Y
N
N
10706
REPS TO DO - 1
10708
REPS TO DO ≥ 0 ?
N
Y
10710
COUNT REPS FOR PHASE ?
N
Y
10712
REPS DONE = TARGET REPS?
N
Y
10714
DO PHASE CHANGE <– YES
10716
TERMINATE <– YES
10720
RETURN TO FIG. 106

FIG. 107

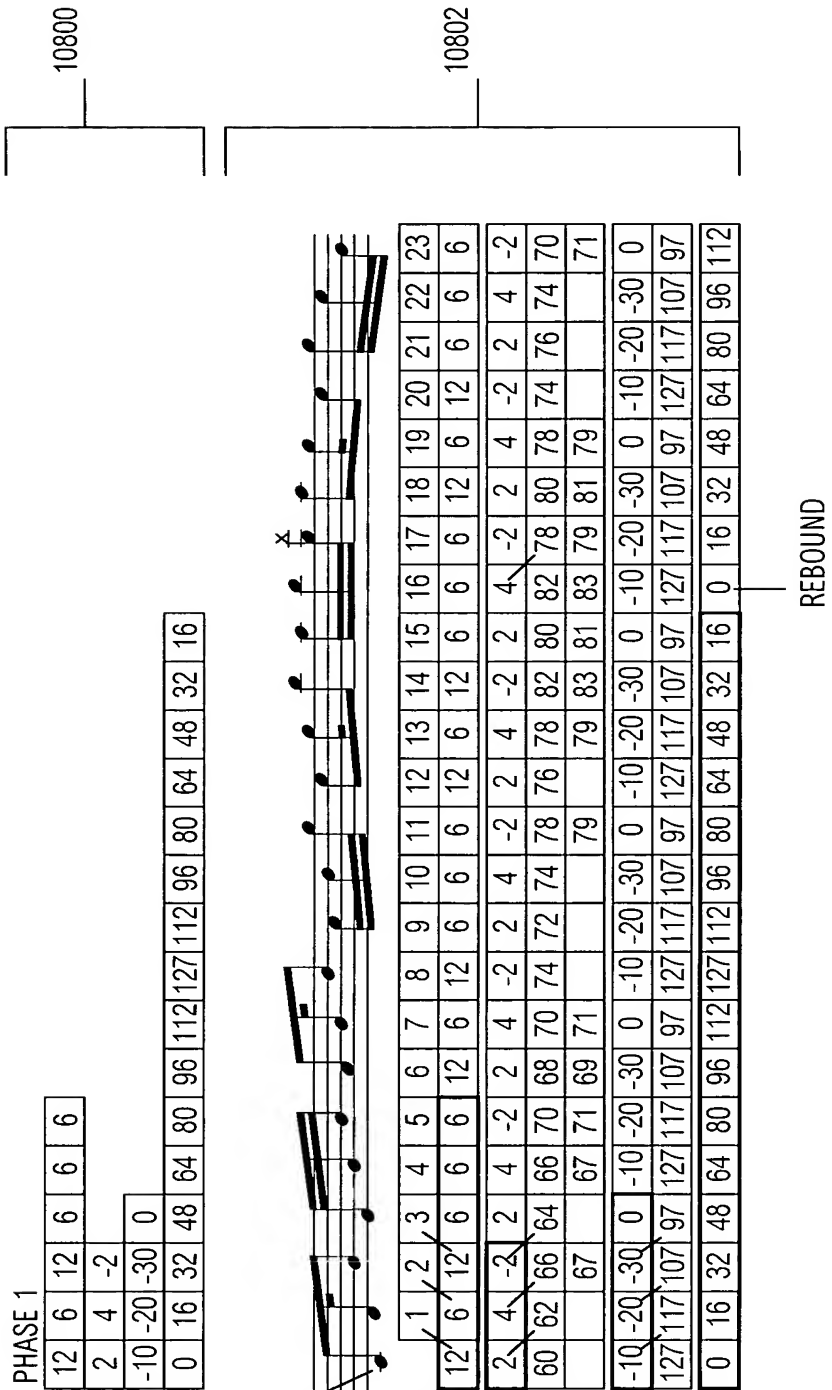

10800
10802
PHASE 1
RHYTHM PATTERN:
TRANSPOSITION PATTERN:
VELOCITY PATTERN:
SPATIAL LOC. PATTERN:
ORIGINAL NOTE (60, 127)
REPEATS:
RHYTHM PATTERN:
TRANSPOSITION PATTERN:
PITCHES:
CONVERTED PITCHES:
VELOCITY PATTERN:
VELOCITY:
PAN:
REBOUND

FIG. 108

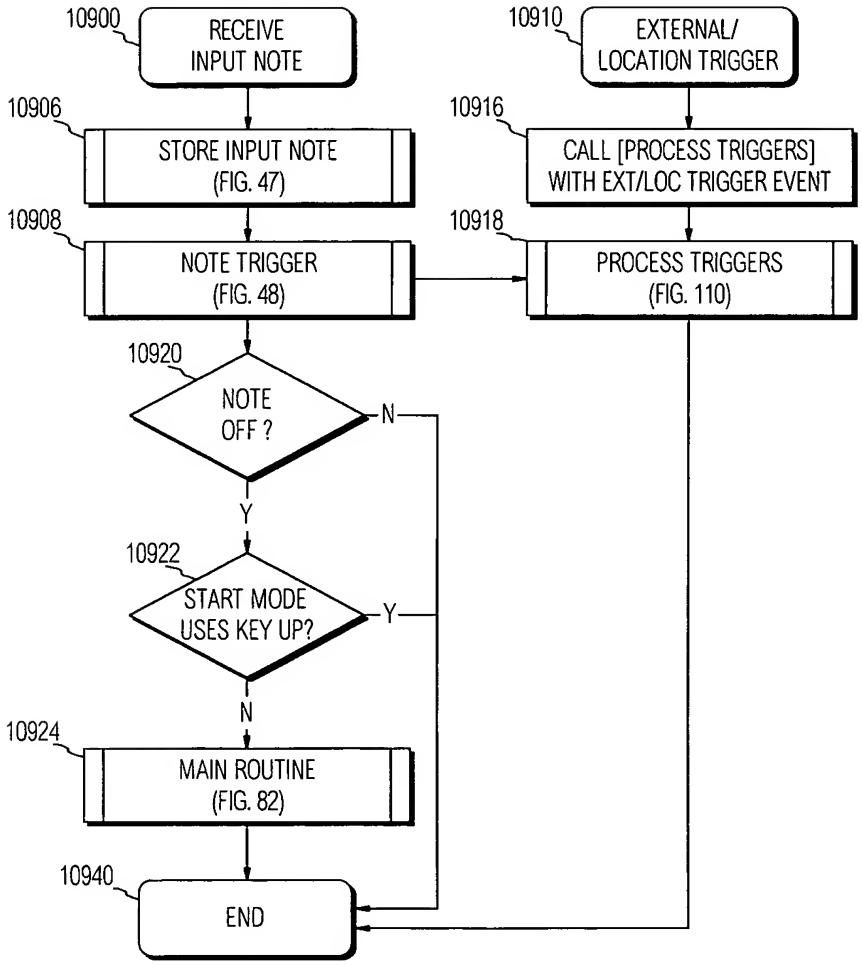

10900
RECEIVE INPUT NOTE
10910
EXTERNAL/ LOCATION TRIGGER
10906
STORE INPUT NOTE (FIG. 47)
10916
CALL [PROCESS TRIGGERS] WITH EXT/LOC TRIGGER EVENT
10908
NOTE TRIGGER (FIG. 48)
10918
PROCESS TRIGGERS (FIG. 110)
10920
NOTE OFF ?
N
Y
10922
START MODE USES KEY UP?
Y
N
10924
MAIN ROUTINE (FIG. 82)
10940
END

FIG. 109

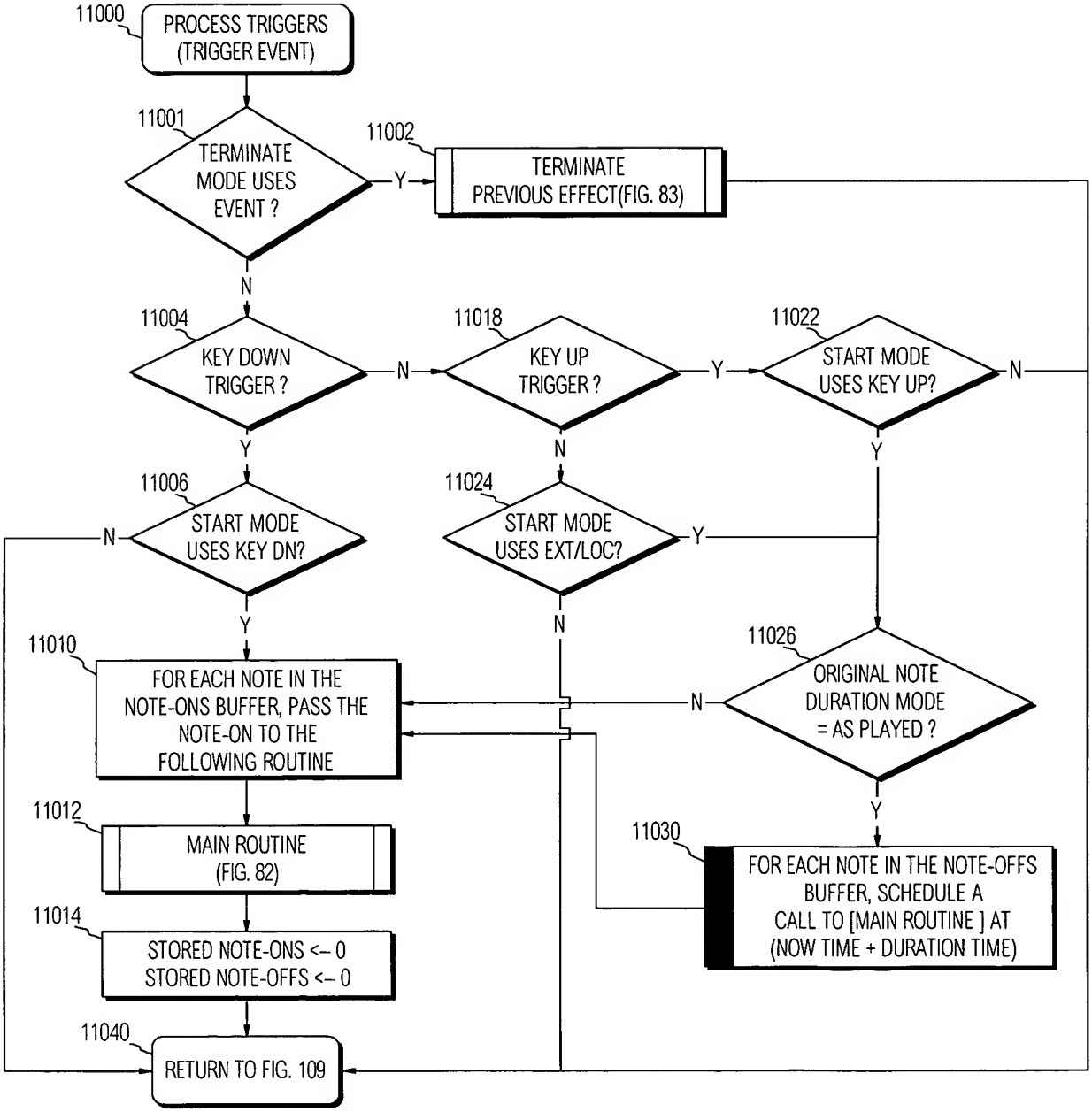

11000
PROCESS TRIGGERS (TRIGGER EVENT)
11001
TERMINATE MODE USES EVENT ?
Y
11002
TERMINATE PREVIOUS EFFECT(FIG. 83)
N
11004
KEY DOWN TRIGGER ?
N
11018
KEY UP TRIGGER ?
Y
11022
START MODE USES KEY UP?
N
Y
N
Y
11006
START MODE USES KEY DN?
N
11024
START MODE USES EXT/LOC?
Y
Y
N
11010
FOR EACH NOTE IN THE NOTE-ONS BUFFER, PASS THE NOTE-ON TO THE FOLLOWING ROUTINE
11026
ORIGINAL NOTE DURATION MODE = AS PLAYED ?
N
Y
11012
MAIN ROUTINE (FIG. 82)
11030
FOR EACH NOTE IN THE NOTE-OFFS BUFFER, SCHEDULE A CALL TO [MAIN ROUTINE] AT (NOW TIME + DURATION TIME)
11014
STORED NOTE-ONS <-- 0
STORED NOTE-OFFS <-- 0
11040
RETURN TO FIG. 109

FIG. 110

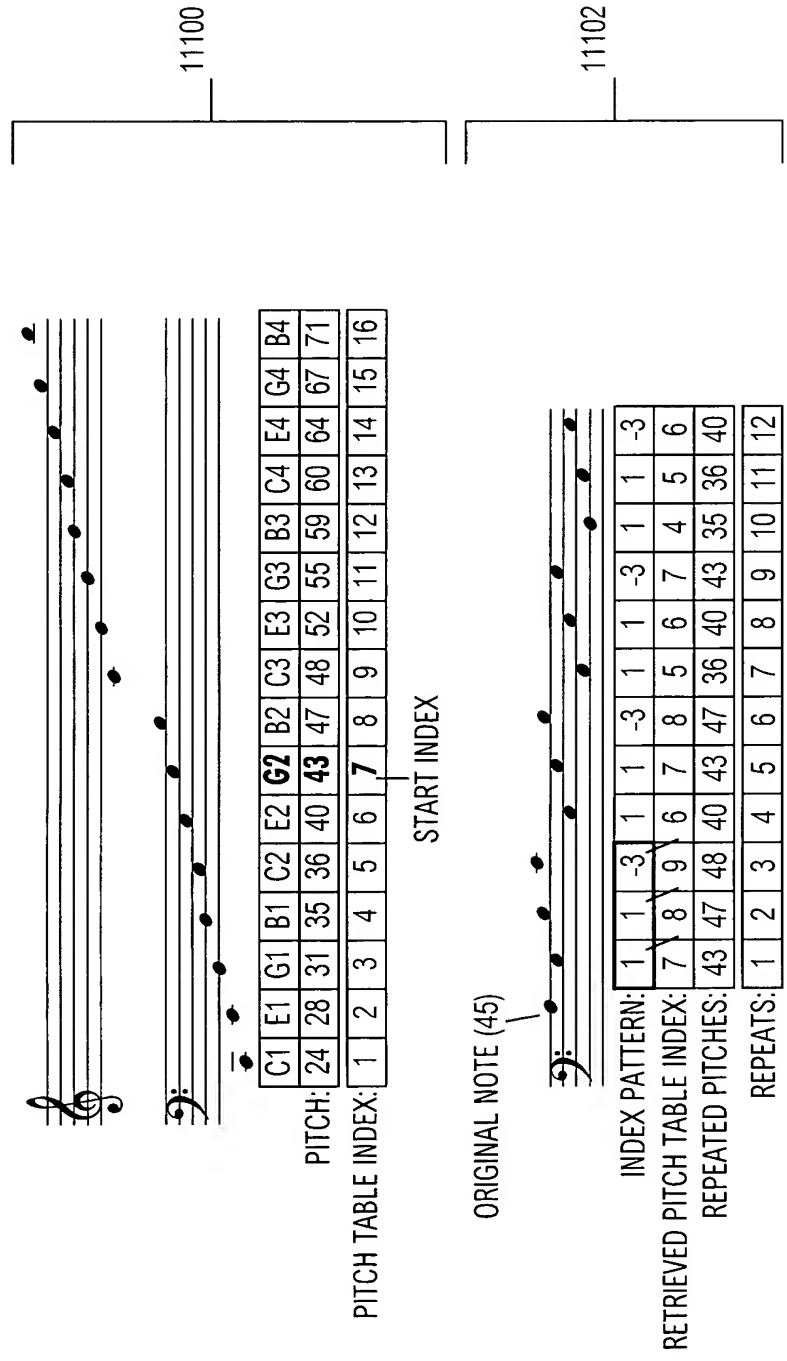

11100
11102
C1 E1 G1 B1 C2 E2 G2 B2 C3 E3 G3 B3 C4 E4 G4 B4
PITCH: 24 28 31 35 36 40 43 47 48 52 55 59 60 64 67 71
PITCH TABLE INDEX: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
START INDEX
ORIGINAL NOTE (45)
INDEX PATTERN: 1 1 -3 1 1 -3 1 1 -3 1 1 -3 1 1 -3
RETRIEVED PITCH TABLE INDEX: 7 8 9 6 7 8 5 6 7 4 5 6
REPEATED PITCHES: 43 47 48 40 43 47 36 40 43 35 36 40
REPEATS: 1 2 3 4 5 6 7 8 9 10 11 12

FIG. 111

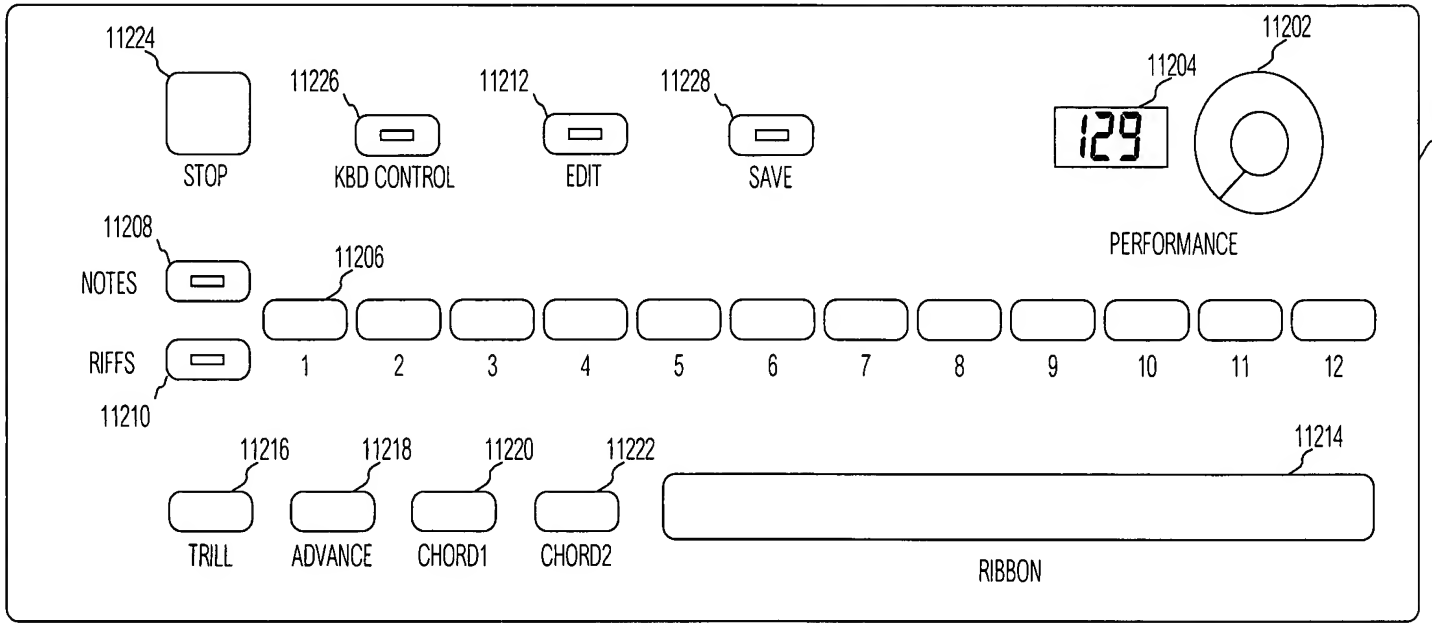


FIG. 112

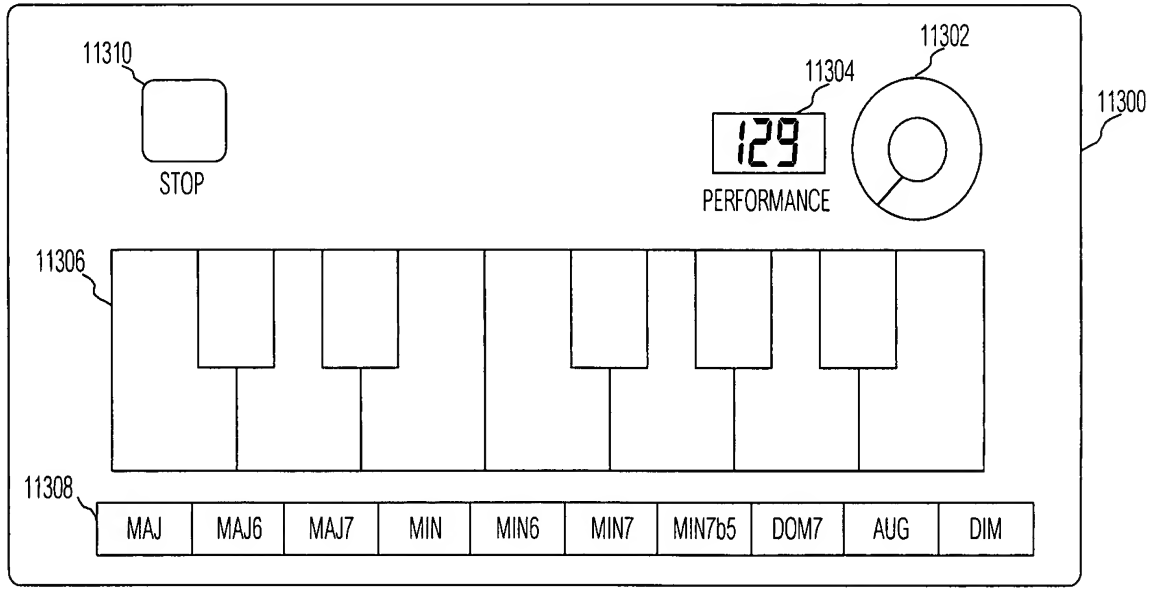


FIG. 113